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**THE ROLE OF COST IN SOVIET MACHINE BUILDING**



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# THE ROLE OF COST IN SOVIET MACHINE BUILDING

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## FOREWORD

To the Soviet leadership the cost of production is one of the most important factors in their planned economy, principally because it is regarded as a measure of the efficiency with which national resources are utilized. There is, however, a general lack of knowledge in the West about the nature of Soviet cost data -- how they are derived and how they are used. This report examines the Soviet concept of cost, the methods by which cost is calculated under varying conditions of production in the machine building industries, and the use to which such cost data are put.

The methods of calculating cost in Soviet machine building are illustrated through a number of hypothetical examples taken from Soviet literature. Particular attention also is devoted to the problems of costing new articles in Soviet machine building. The use of costs as a basis for planning prices is examined only in passing because it is regarded as a subject requiring more treatment than it can receive in this report.

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## THE ROLE OF COST IN SOVIET MACHINE BUILDING

### Summary and Conclusions

The Soviet state attempts to regulate the consumption of national resources at state enterprises through its costing system and its program of cost responsibility. Costs also are used in planning the prices of goods and services in the USSR, although the degree of direct correlation between costs and prices is not known. This report focuses primarily on the use of cost accounting in Soviet machine building to plan and to reduce progressively expenditures in the manufacture of machinery and equipment. The use of cost accounting as a method for measuring and effectuating changes in efficiency of production is not, of course, unique to -- much less original with -- the USSR, having been employed by industrial firms in market-oriented economies for many years. What is significant, in contrast to market-oriented economies, is the scale on which a more or less uniform national costing system has been established in the USSR. The establishment of a high degree of uniformity in cost accounting at Soviet state enterprises is intended not only to simplify state regulation of the level of expenditures at many such enterprises but also to insure homogeneity of data for statistical purposes.

The cost\* of goods in the USSR generally reflects a less inclusive concept of cost than is the case in market-oriented economies. Stemming from the organization of the Soviet economy itself, with preponderant state ownership of the means of production and with the absence of competition in the domestic market, such items of cost as land rents, insurance, interest on capital, and sales promotion, for example, are not reflected in the cost of Soviet goods. Expenditures for specialized training of personnel as well as for research and development, which are commonly borne as items of cost by private enterprises in a market-oriented economy, may in some cases be partly or entirely financed out of the state budget in the USSR and consequently may not be fully reflected in the ruble cost of the output of an enterprise. Because they are less inclusive, it may generally be said that the given unit costs of Soviet machinery and equipment are understated relative to the costs of similar articles manufactured in a market-oriented economy.

\* The term cost as used in this report refers to the production cost (sebestoimost').

The costs of production in Soviet industry do not tend to be as responsive to short-run scarcities of supply as in a market-oriented economy, because the Soviet government establishes the prices of the factors of production on a nationwide basis in advance of each accounting period. The costing of the direct factors of production in Soviet industry is largely a process of converting physical inputs of production into ruble values on the basis of preplanned conversion ratios (fixed prices of materials, fixed wage rates, output norms, and the like).

In spite of the absence of market competition and private enterprise in the USSR -- and the absence of the attendant effects that market competition may have on costing and pricing practices at the enterprise level -- it may be said that those aspects of cost accounting which are properly concerned with the exercise of managerial control over the costs of production are generally similar in the US and the USSR. The similarity between the systems of cost accounting in the two countries is most marked in the accounting concepts employed, especially in the use of standards for measuring variations in costs. Cost accounting in both countries probably is more oriented toward the primary objective of reducing costs than is true in Western European countries where the primary objective of cost accounting is reportedly the ascertainment of product unit costs for the purpose of establishing prices. This situation probably is explained by the anomalous fact that in the more competitive US industries and under Soviet conditions of state monopoly alike the price structure is such that enterprises tend to increase profits through the reduction of costs rather than the raising of prices.

In spite of the similarity in the primary objectives of cost accounting in the US and the USSR, there probably is greater emphasis on determination of the unit cost of manufactured articles in the USSR than in the US, in part as a result of the Soviet use of such data in the construction of industrywide indexes showing periodic reductions in the cost of output. Periodic reductions in the cost of output are regarded as an indication of increased efficiency of production and are, therefore, an important objective of Soviet economic planning. The difference between fixed enterprise wholesale prices and declining unit costs of output at state enterprises represents "profit" and is the major source of capital accumulation by the state.

In the absence of private profitmaking as a stimulus to holding down costs in production, the USSR has recently introduced financial incentives in the form of bonuses for managerial personnel who meet or exceed plans for the cost of output, provided that they simultaneously fulfill the other major production goals. The principal



method for systematically controlling costs in the USSR, as in the US, however, is the establishment of production standards or norms.\* Official state norms governing operations are an integral part of the production program of Soviet machine building plants.

Whether in the US or the USSR, the establishment of production norms and the allocation of cost is often an involved procedure in machine building, where large numbers of heterogeneous articles, including many new articles, may be produced at a single plant in a given period. Insofar as possible, the costs of materials and the wages of production workers in the USSR are directly allocated to the specific end articles manufactured, whereas overhead costs are indirectly allocated among the articles.

The most common method of cost accounting in Soviet machine building is the so-called normative method. Under this method, norms are set in advance for the outlays required to meet the production program of a plant, the norms usually being based on theoretically substantiated opportunities to realize savings in comparison with the previous production period. Deviations from the norms for the outlays that occur in actual production are recorded in the accounts of the plant. Such deviations, expressed in ruble values, are then added to or subtracted from planned costs to derive actual costs at fixed intervals during the production process. On the basis of periodic reports, deviations may be traced to their source and corrective action taken before the accounting period is completed. In this way, norms serve not only to establish the planned cost of production but also to check on and regulate the actual cost of production at frequent intervals. The normative method is most suited to large-scale production.

A number of important types of machinery and equipment are produced in small series or as individual units, especially in shipbuilding and heavy machine building. Because the nature of small series and custom production does not readily lend itself to the normative method of accounting, the so-called order method is used. The cost of an order placed for a custom-built heavy press, for example, is estimated in advance, but, in the absence of substantiated norms governing the building of the press, it is difficult to ascertain how far the actual cost may reasonably deviate from the estimated cost during the various stages and operations of the production process. In some cases the soundness of the estimate itself may be in question. In any event, total actual cost is not determined until the order has been filled, sometimes only after a period of months or even years.

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\* For a discussion of the Soviet system of norms, see Appendix B.

New articles going into series production for the first time, like articles manufactured on a custom basis, are not initially covered by substantiated norms. Consequently, costs can only be estimated. The cost of new articles in Soviet machine building is generally quite high because of the practice of writing off in the first 2 years of their manufacture all plant costs connected with the designing, manufacturing, and testing of prototypes as well as the tooling for production. Because there are no previously established costs with which to compare the actual cost of new articles, the output of Soviet machine building is divided into two categories -- comparable output and noncomparable output -- for purposes of computing an index of change in cost. The index of change in cost is computed only for comparable output and includes only articles that are in at least their second consecutive year of production.

Comparable output accounts for a smaller percentage of commodity output\* in Soviet machine building than in practically any other Soviet industry. In contrast to the mining, oil extraction, and lumbering industries, where allegedly 90 to 100 percent of the commodity output is comparable from one year to the next because of the homogeneous nature of the product, only 50 to 60 percent of the commodity output in Soviet machine building was credited in 1957 with being comparable. The sizable share of noncomparable output in machine building reflects the large number of new articles manufactured annually, largely as a result of the Soviet policy of encouraging the adoption of new and improved types of machinery and equipment throughout the economy.

Soviet economists have been critical of the index of change in cost for some time largely because it does not include the noncomparable segment of commodity output and because, being a link index, it tends to overstate annual reductions in cost in those industries, such as machine building, where sizable annual reductions are realized from declines in the initial high unit costs of new articles after their first year of production. Accordingly a new index showing reductions in outlays per ruble of commodity output (comparable and noncomparable) was adopted to replace the index of change in cost as the official index under the Soviet Seven Year Plan (1959-65). The new index, which is based on the ratio of the outlays of production to the total value of commodity output expressed in wholesale enterprise prices, is itself the target of many criticisms. Soviet economists charge, among other things, that this index does not strictly reflect the dynamics of cost but rather the change in profitability (in which

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\* For a brief explanation of commodity output and the difference between commodity output and gross output in Soviet industry, see the first footnote on p. 17, below. Also see III, B, p. 34, below.

cost is only one factor). The new index appears to be far from a satisfactory substitute for the older cost reduction index based on comparable output, which is still in limited use.

Among Soviet industries, machine building is generally credited with registering one of the highest, if not the highest, annual percentage reductions in cost. Although no firm data on annual reductions in cost in Soviet machine building as a whole are available for the years since 1944, it is claimed that, under the Fifth Five Year Plan (1951-55), average annual reductions in the cost of comparable output ranged between approximately 8 and 10 percent in the machine building industries. Meanwhile, the reduction of cost in machine building is significantly reflected in reductions of cost in the commodity output of industry as a whole because of the large contribution made by machine building to industrial output. Although reduction of cost in Soviet industry under the Fifth Five Year Plan was planned at 25 percent and was actually 23 percent, the planned reduction under the abortive Sixth Five Year Plan (1956-60) was 17 percent and under the current Seven Year Plan is to be "no less than 11.5 percent."\*

Soviet reliance on domestic sources of production to meet its rapidly expanding requirements in goods has, through the years, fostered production of essential articles at some machine building plants that produced at relatively higher costs than other plants. Consequently, prices on such articles had to be set high enough to give a profit on average costs, the extra profits from the more efficient plants of a ministry being used to cover the losses of the less efficient plants. One method by which the USSR is now seeking to reduce cost in Soviet machine building is by eliminating high-cost production through greater specialization of output at individual plants.

In spite of the allegedly increasing influence of cost considerations on the structural organization and the production program of Soviet machine building, it may reasonably be assumed that the desire of the Soviet leadership to attain or surpass the technological level of the industrialized West in key industries will, from time to time, justify the priority of selected physical production targets over considerations of cost. The recently initiated program for radically and rapidly increasing the domestic production of petrochemical equipment by dispersing such production among various types of machine building plants as well as by expanding the petrochemical equipment industry itself, for example, emphasizes that under the Soviet system

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\* This target figure presumably is based on the new index showing the decline in outlays per ruble of commodity output.

of selective forced-draft development of critical industries, physical production targets of machinery and equipment are of paramount importance when imports cannot be relied on to fill domestic requirements.

In addition to their use in planning and controlling consumption of resources, in establishing prices, and in measuring changes in productional efficiency, costs also are used in the USSR to determine the balance between materials (including fuel, energy, and amortization) and wages within industries. In general, a decline in outlays for wages relative to outlays for materials is considered in the USSR to be an indication of technological progress and, consequently, an economically desirable development. Although the share of wages (including deductions for social insurance) in Soviet machine building declined from 51.1 percent of total cost in 1932 to 31.7 percent in 1959, machine building remains one of the more labor-intensive industries in the USSR. This fact is explained by the relatively higher wages and/or relatively larger amounts of manual labor required in various machine building industries compared with industry as a whole. An interesting trend in the structure of cost in machine building was the perceptible increase in the share of wages in total outlays during the middle 1950's. This reversal of the secular trend toward a lower share for wages probably can be ascribed to reductions in the wholesale prices of material inputs as well as to wage increases that took place during the period.

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## I. Introduction

### A. General Features of Cost and Cost Accounting in the USSR\*

Production costs (sebestoimost') in the USSR are used to measure, record, analyze, and plan outlays of production with the aim of controlling the consumption of resources at state enterprises. The cost of goods in the USSR generally reflects a less inclusive concept of cost than is the case in market-oriented economies. Stemming from the organization of the Soviet economy itself, with preponderant state ownership of the means of production and the absence of competition in the domestic market, such items of cost as land rent, insurance, interest on capital,\*\* and sales promotion, for example, are not reflected in the cost of Soviet goods. Other items of cost that are often borne by the private enterprise in a market-oriented economy, such as specialized training of personnel as well as research and development, may in some cases be partly financed out of the state budget in the USSR and so may not be fully reflected in the ruble cost of an enterprise's output. In general, the cost of output in Soviet machine building is calculated on the basis of the current operating expenses of the producing plant. In comparison with similar US goods, the cost of Soviet machinery and equipment probably is understated as a result of differences in the comprehensiveness of cost in the two countries.

The costs of production in Soviet industry do not tend to be as responsive to short-run scarcities of supply as in market-oriented economies, because the Soviet government establishes the prices of the factors of production on a nationwide basis when planning the over-all physical requirements of the national production program. The costing of the direct factors of production in Soviet industry is largely a process of converting the inputs of production into ruble values on the basis of preplanned conversion ratios (fixed prices of materials, fixed wage rates, output norms, and the like).

In spite of the absence of market competition and private enterprise in the USSR -- and the absence of the attendant effects that market competition may have on costing and pricing practices at the enterprise level -- it may be said that those aspects of cost accounting which are properly concerned with the exercise of managerial control over costs of production are similar in the US and the USSR. Of course, the various existing methods of cost accounting are designed

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\* 1/. For serially numbered source references, see Appendix E.

\*\* The initial cost of building and equipping most state enterprises is covered from the state budget in the form of an interest-free charter fund. For a fuller explanation of the charter fund, see Appendix A.

to meet the specific requirements of those who employ them. Because the methods of cost accounting used in the USSR are prescribed by the state and are mandatory for all state enterprises in the country, there is certainly greater uniformity in cost accounting and reporting practices than in the US, where enterprises are generally free to follow any accepted practice they please. In the USSR, as in the US, however, techniques of cost accounting are under constant analysis, and there are always areas of controversy with respect to the superiority of one or another technique, often based on the objectives that those who use cost accounting are pursuing.

The similarity between cost accounting in the US and the USSR is most marked in the accounting concepts employed, especially in the use of standards for measuring variations in costs.\* Cost accounting in both countries probably is more oriented toward the objective of reducing costs than in Western European countries, where the primary objective of cost accounting is reportedly the ascertainment of product unit costs for the purpose of establishing prices. This situation probably is explained by the anomalous fact that in the more competitive US industries and under Soviet conditions of state monopoly alike the price structure is such that enterprises tend to increase profits through the reduction of costs rather than through the raising of prices.

In the absence of private profitmaking as a stimulus to holding down costs in production, the USSR has recently introduced financial incentives in the form of bonuses for managerial personnel who meet or exceed plans for the cost of output, provided that they simultaneously fulfill the other major production goals. In the machine building industries this new bonus system went into effect on 1 January 1960. Except for several currently critical types of equipment, such as electrical and electronic equipment, chemical equipment, petroleum equipment, and equipment for the metallurgical industry, the new bonus system based primarily on cutting down costs supplants the old bonus system based primarily on meeting or exceeding physical production targets. Bonuses are more modest under the new system than under the old and in the machine building industries cannot exceed 40 percent of an

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\* Because the description of cost accounting in Soviet machine building that is found in this report is based on primary Soviet sources and is intended to be an aid to those who may be working with Soviet data, the cost accounting terminology used is that found in Soviet publications. Although readers familiar with US cost accounting terminology may have little difficulty in equating such basic terms as planned cost, actual cost, deviations, and norms in the USSR to standard cost, historical cost, variances, and standards, respectively, in the US, it is believed to be advisable not to push the identity of these concepts and terms too far by employing US terminology to describe Soviet cost accounting.

individual's salary. Although the new bonus system may, in part, be designed to eliminate some of the abuses connected with the old system of bonuses and may reduce the size of bonuses paid to supervisory and technical personnel, it probably reflects as well the ever-increasing use of cost accounting by the Soviet regime to effectuate more efficient utilization of resources.

In spite of the similarity in the primary objective of cost accounting in the US and the USSR, there probably is greater emphasis on determination of the unit cost of manufactured articles in the USSR than in the US. A separate form for reporting unit costs is provided among the documents that a Soviet machine building enterprise submits to the central statistical and financial agencies at periodic intervals. Such data are used to construct industrywide indexes on reductions in the cost of output.

To what extent the initial enterprise wholesale prices\* of articles in machine building bear a uniform percentage relationship to their initial planned unit costs remains a moot question in spite of inferences in Soviet literature that some degree of uniformity exists between costs and prices at this accounting stage. Because of the absence of competition in the domestic Soviet economy, it would seem that, in general, prices in the USSR might have a more direct correlation to unit costs than in the US, where the complex factors of competition must often be reckoned with in the pricing policy of an enterprise. The Soviet practice of leaving prices in effect for relatively long periods of time while unit costs decline, however, indicates that over a period of time any initial relationship is destroyed. Not until such time as enterprise wholesale prices are administratively reviewed and readjusted to prevailing unit costs is the initial percentage relationship restored between the unit cost and the price of an article.

Reductions in unit costs are an important objective of Soviet economic planning because they are used to calculate economies realized in production. The difference between the fixed enterprise wholesale prices of output and the declining unit costs of output at Soviet state enterprises represents "profit." Such profit is the major source of capital accumulation by the Soviet state, and systematic reduction of unit costs is regarded as an important method of helping to finance capital investment programs.

\* Producer goods manufactured at Soviet machine building plants are generally sold by the manufacturer directly to other state enterprises at enterprise wholesale prices; consumer durables (such as refrigerators, stoves, radios, and television sets) manufactured at machine building plants also have enterprise wholesale prices but are sold to the public at state retail prices.

B. "Khozraschet," or the Principle of Economic Accountability\*

Soviet machine building plants operate within the statewide system of khozraschet (khozyaystvennyy raschet).\*\* The khozraschet system of the USSR is intended to encourage operational efficiency and financial self-sufficiency in state enterprises which might otherwise be a drain on the state budget. Soviet spokesmen describe khozraschet as "a socialist method of economic management which seeks to establish commensurability between the monetary value of the outlays of production and the financial status of an enterprise as reflected in the results of its economic activities." A khozraschet enterprise is ordinarily expected to recover from the sale of its output (goods and services) the cost of the outlays of production as well as to show a margin of profit.

Khozraschet is the principal method of establishing a regime of economy at enterprises in order to achieve the best results with the least outlays. It makes the financial and economic status of each enterprise directly dependent on fulfillment of the indexes contained in the state plan. 3/

Although the volume of output, the product mix, the cost of the outlays of production, and the prices of the output of an enterprise are, in the final analysis, centrally determined, the management of each khozraschet enterprise is responsible for seeing that all possible economic measures are taken at the enterprise to meet or exceed the planned targets. Because the bulk of the cost of production in a machine building plant is incurred in the semifinishing, machining, and assembly shops, many machine building plants extend the principles of khozraschet to the individual shops and their subunits.

This practice is known as intraplant khozraschet and requires a detailed record of the outlays of production by shop, section, or

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\*\* The term khozraschet has been variously translated as "self-supporting," "nonfinancing by the state," "cost accounting," "cost accountability," "economic accounting," "economic accountability," and "nonbudgetary." Although each of these terms describes some facet of khozraschet, none is wholly adequate in itself. Consequently, the Russian term is used throughout this report. For a brief discussion of the evolution of the khozraschet system as well as the distinguishing features and juridical status of khozraschet enterprises, see Appendix A.



other subunit to be kept so that actual performance can be quantitatively and qualitatively compared with the planned indexes. Like a khozraschet enterprise, a khozraschet shop is provided with the fixed capital required for performing a particular production process, and the shop is then given a plan that specifies the quantity, quality, and mix of its output along with appropriate norms governing the outlays of materials and labor. The planning and bookkeeping departments of a khozraschet enterprise must keep various regional and central organizations of the state informed of the enterprise's progress in fulfilling the plan and, if the enterprise is deviating from planned indexes beyond the permissible limit, must pinpoint the reasons for the deviation and take corrective measures.

### C. Accounting and Reporting Procedures\*

Because the immense state-operated Soviet economy requires a large degree of centralized control to insure that organizations and individuals operate within the framework of the state plan for economic development, a tremendous network of offices for the accounting (bukhgalterskiy uchet) and reporting (otchet) of economic data has been created. The data submitted by Soviet enterprises are used not only for direct control purposes but also for compiling national, regional, and industrial branch indexes. Consequently, Soviet accounting and reporting procedures are oriented toward these ends. The data reported during one plan period are used as the basis for planning the indexes of the following period.

The principal source of data at the plant level is the primary document (pervichnyy dokument). The data for these simple control accounts come both from the production shops of a plant, where the costs of materials and labor that enter directly into production are allocated to the appropriate articles of output, and from the various offices, shops, and laboratories, where overhead costs also are allocated among the articles of output. These documents are drawn up on the completion of each operation or series of similar operations for the purpose of recording basic production data that can be directly forwarded or further processed. The periodical reports that are forwarded by the plant to administrative, statistical, and financial organizations superior to it may contain primary data in their initial form, may summarize data from a large number and variety of primary documents, or may contain statistical indexes derived from data contained in primary documents.

Until Soviet industry was largely reorganized from a centralized ministerial system of administration to a regional system of administration in mid-1957, each machine building plant reported cost

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data to its controlling administrative organization, usually a department or administration of its ministry in Moscow. After the data from all the plants of the ministry had been summarized, they were transmitted to the Central Statistical Administration (CSA), which had previously received copies of the plant reports through its regional offices, presumably as an independent check on the ministries as well as to enable preliminary statistical computations to be made. Since the reorganization of industry, all but one of the machine building ministries have been abolished, and administrative control over the machine building plants has been largely vested in regional economic councils (sovnarkhozy), which in turn are subordinate to the councils of ministers of the various republics in which they are located. Machine building plants, like other industrial enterprises, now report their cost data to regional organizations for administrative purposes. As before, however, direct reporting of individual plants to the regional offices of the CSA is continued. Data-processing centers set up by the CSA within the regions transmit the data to the CSA in Moscow.

D. Centralized Organizations Concerned with Accounting and Reporting\*

The CSA bears the major responsibility for running the nationwide system of statistical accounting and reporting. Because of the need for close contact between the planning authorities and the collectors of statistics, the CSA for a period was part of Gosplan, USSR. In 1948, however, the CSA was detached from Gosplan and placed directly under the Council of Ministers, USSR, allegedly to perform its ever-increasing workload with a greater degree of independence.

At present the CSA exercises centralized control over the Soviet accounting system through a ramified network of statistical offices. In each of the 15 union-republics there is a republic statistical administration with branch offices in the various administrative-territorial divisions of the republic. Administrative control of the reported cost data for machine building was formerly exercised by the various specialized machine building ministries but is now the immediate concern of machine building administrations under the regional economic councils. The methodology of compiling, analyzing, and reporting cost data, however, is supervised by the CSA. The CSA hands down instructions concerning accounting and statistical reporting to departmental heads who, in turn, pass them down through channels. Local CSA bodies receive copies of these instructions in order to assist and check on departmental reporting.

Other centralized organizations concerned with accounting and reporting in the Soviet economy are Gosplan, USSR, and the Ministry of

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Finance, USSR. The CSA coordinates with Gosplan its annual plan of statistical projects, including the forms for recording statistical data, instructions, and methodological provisions. In turn, Gosplan coordinates all the methodological instructions it sends to the 15 constituent union-republics (formerly to the ministries) in connection with the drafting of the state plans, including cost estimates, with the CSA. This coordination is intended to provide a unified methodology in planning and reporting so that statistical indexes will be comparable.

Within Gosplan, USSR, the departments responsible for planning the development of the various machine building industries are believed to work with the Department of Prices and Cost in coordinating the planning of costs and prices for machinery and equipment of national importance. Special state committees established directly under the Council of Ministers, USSR, to guide the development of the important machine building industries engaged in defense production are believed to work closely with Gosplan, USSR, in matters of planning.

The Ministry of Finance, USSR, supervises the methodology of accounting in cooperation with the CSA. Together with the CSA, it approves standard forms for invoices and accounts as well as instructions pertaining to filling out these forms. The forms for the annual plan fulfillment reports of industrial enterprises are approved jointly by the CSA and the Ministry of Finance, USSR.

## II. Techniques of Computing Cost in Machine Building

### A. Estimate of Outlays for Production\*

For purposes of computing the cost of the different types of outlays required to meet the over-all production program of an entire machine building industry or an individual machine building plant, the drawing up of an estimate of outlays for production (smeta zatrat na proizvodstvo)\*\* is required. This method of itemizing the outlays needed to fulfill the planned production program also provides the data used by Soviet economists in analyzing the structure of cost.\*\*\* In Soviet machine building the estimate of outlays for production consists of the following eight primary economic elements (pervichnyye ekonomicheskiye elementy): basic materials, auxiliary materials, fuel, energy, wages, deductions for social insurance, amortization, and other expenditures.

The sum of these elements reflects the total cost to an industry or a plant of the goods and services for which it must spend its financial resources. As such, the estimate of outlays for production serves as the basis for establishing the financial plan of each machine building plant. The itemization of cost by primary economic elements at the plant level conforms to the method of itemizing cost in the state plan. In this way the sum of the cost of the resources allocated to the individual plants of an industry is kept in balance with the cost of the resources allocated to the industry as a whole.

### B. Calculation

#### 1. General Features<sup>†</sup>

However useful they may be for over-all planning purposes, the primary elements of cost contained in the estimate of outlays for production do not readily lend themselves to computing the unit cost of specific articles or to analyzing and controlling the day-to-day operations of the various shops and departments within the plant. The complex technology and organization of production in machine building as well as the variety of articles produced give rise to the movement of many different articles through successive stages of manufacture in the semifinishing, machining, and assembly shops of a plant, where the major share of the production costs originate. These main production

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\*\* Frequently referred to in abbreviated form as "estimate of production" (smeta proizvodstva).

\*\*\* For the structure of cost, see IV, p. 53, below.

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shops of the plant are, in turn, serviced by auxiliary shops. In order to use the data contained in the estimate of outlays for production to compute the cost of individual articles being produced throughout the plant, the data are regrouped into "items of calculation" (kal'kulyatsionnyye stat'i), which conform more closely with the internal accounting system of the plant. Insofar as possible, the costs of materials and the wages of production workers are directly allocated to the specific end articles manufactured, whereas overhead costs are allocated among the output by indirect methods.

The items of calculation in Soviet machine building, like the primary economic elements, are specifically prescribed by the state. The eight major items of calculation,\* none of which exactly corresponds substantively with the primary elements even when bearing the same name, are as follows: materials, fuel used directly in the production process, electric energy used directly in the production process, wages paid to production workers, deductions for the social insurance of production workers, shop expenditures, general plant expenditures, and nonproductional expenditures. The accompanying chart\*\* shows how the homogeneous primary economic elements are dispersed among the items of calculation when outlays are reitemized for purposes of calculation.

A comparison between the outlays of production expressed as primary elements and as items of calculation shows that the items of calculation pinpoint the source of costs within the plant, whereas the primary elements reflect the composition of the over-all requirements of the plant. These two techniques of computing cost are reconciled in the cost section of the technical, industrial, and financial plan (tekhpromfinplan). The regrouping of primary elements into items of calculation is achieved through the technical-economic indexes contained in various sections of the tekhpromfinplan. These indexes, which are based on established material consumption norms and labor consumption norms,\*\* are expressed in ruble values as well as in physical terms. In this way, cost is the common denominator of the tekhpromfinplan wherein all the production activities of the plant are reconciled with one another and with the over-all production program of the plant. Whether broken down into primary elements or into items of calculation the total outlays for production are, of course, identical.

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\* Depending on the size and importance of expenditures included under any of these eight major items, the number of items may be increased or decreased. See 3, p. 23, below; Table 2, p. 40, below; and Table 6, p. 77, below.

\*\* Following p. 16.

\*\*\* For a discussion of consumption norms, see Appendix B.

# USSR

## The Dispersion of Primary Economic Elements Among Items of Calculation

Primary Economic Elements	Distribution Among Items of Calculation
Basic Materials	<i>Materials</i>
Auxiliary Materials	<i>Materials</i> <i>Shop expenditures</i> <i>General plant expenditures</i>
Fuel	<i>Fuel used directly in the production process</i> <i>Shop expenditures</i> <i>General plant expenditures</i>
Energy	<i>Electric energy used directly in the production process</i> <i>Shop expenditures</i> <i>General plant expenditures</i>
Wages	<i>Wages paid to production workers</i> <i>Shop expenditures</i> <i>General plant expenditures</i>
Deductions for Social Insurance	<i>Deductions for the social insurance of production workers</i> <i>Shop expenditures</i> <i>General plant expenditures</i>
Amortization	<i>Shop expenditures</i> <i>General plant expenditures</i>
Other Expenditures	<i>Shop expenditures</i> <i>General plant expenditures</i>

Note: This figure reflects production costs only.

Because of the important purpose it serves in the Soviet costing system, the technique of computing cost known as "calculation" (kal'kulyatsiya) deserves a detailed examination. Calculation is primarily used to allocate production costs among the specific goods and services produced by a plant as a whole or by its individual shops and departments. The unit cost of individual articles is calculated not only as a prerequisite to establishing their prices and subsequently to constructing indexes of gross output (valovaya produktsiya) and commodity output (tovarnaya produktsiya) but also to constructing indexes of change in the cost of commodity output for purposes of evaluating changes in the efficiency of production.\*

Because of differences in the degree of specialization, the type of output, and the organization of production from plant to plant, several methods are used in Soviet machine building for keeping the account of outlays expended in the manufacture of the output of a plant. The exact number and title of item headings in calculation at a given plant depends largely on the particular method of keeping accounts.

In Soviet machine building the three principal methods of accounting the outlays of production and, hence, of calculating costs are the following: the normative (normativnyy) method, the order (zakaznyy or pozakaznyy) method,\*\* and the mass conversion (peredel'nyy or poperedel'nyy) method. In passing, a fourth method should perhaps be mentioned, the so-called "boiler" (kotlovoy) method, which is apparently all but obsolete.\*\*\* The normative method is by far the most prevalent. In practice, because of diversified production

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\* Commodity output includes only production of explicit goods and services that are designed to enter into the national turnover during a given period, whereas gross output in machine building also includes the difference in unfinished production on hand at the beginning and at the end of the period as well as some intraplant turnover. Indexes of gross and commodity output valued in ruble prices serve in the USSR as the principal measure of growth of a plant or an industry. Because of the more specific nature of commodity output in comparison to gross output, most Soviet cost indexes are computed on the basis of commodity output.

\*\* Also referred to as the batch (partionnyy or popartionnyy) method.

\*\*\* Under this method, expenditures in excess of norm expenditures are merely distributed among the individual types of output in proportion to the planned cost of each type. Because the "boiler" method does not provide a basis for determining the nature or cause of excessive expenditures, it has been in disfavor with Soviet officials.

programs at some machine building plants, more than one method may be employed.

## 2. Methods

### a. Normative Method\*

The normative method of calculating cost is the method most highly favored by Soviet officials because it affords the state the most complete control over month-to-month consumption of resources. The normative method is especially suited to the compilation of comprehensive statistical data on costs at machine building plants engaged in the mass and large-series production of a variety of articles. Costs calculated by the normative method are described by Soviet spokesmen as being more scientifically substantiated than those calculated by the other methods.

Within most Soviet machine building plants, the setting of norms in the production processes is mandatory in planning the production program. Technical-economic norms are an integral part of the system of cost accounting at such plants. In addition to setting norms for the principal outlays (materials and wages), estimates of expenditures for services and for administration of the plant (overhead) also are broadly treated as norms.\*\* The alleged superiority of the normative method as compared with the other methods of accounting and calculating is generally attributed to four specific features, as follows: the prompt reflection of deviations from norms in the accounts and reports of the plant, the use of norms as indexes of change in production efficiency, the method of allocating production costs between finished and unfinished output, and the use of aggregative statistical techniques that simplify accounting procedures.

(1) Under the normative method a close check may be kept on whether or not actual cost is deviating from planned cost. If actual cost is, in fact, deviating from planned cost, the normative method of accounting and calculating also reveals the source of the deviation and enables prompt remedial measures to be initiated. If the responsibility for the deviations can be traced to individual persons or departments in the plant, such persons or departments may be penalized accordingly.

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\* 8/. For graphic examples and a textual description of the steps followed in making normative calculations, see Appendix C.

\*\* For a discussion of norms in the USSR, see Appendix B.



The most commonly cited causes for deviations from material consumption norms\* at Soviet machine building plants are as follows:

(a) The nonconformance in type and size of raw materials delivered to the plant with those established by state standards. Delivery of such materials results either in waste of materials or in an increase in the weight of the finished article. The suppliers of such materials are usually held responsible when deviations from norms result from this cause.

(b) The substitution by the plant of one kind of raw material for another.

(c) Unnecessarily large allowances of materials resulting from incorrect layouts, templates, and the like.

Deviations from the established norms for the wages of production workers usually can be traced to the supplementary payroll. Because wages are charged against specific articles of output, it is possible to relate deviations from the wage norms directly to the appropriate type of output. Such deviations occur most often as a result of disruptions in the normal working pattern occasioned by the necessity of reprocessing raw materials or by the use of cutting tools of inferior quality.

Although deviations from norms for direct expenditures such as materials and the wages of production workers can be shown in primary documents, the practice of recording them there has not become as firmly established as Soviet officials would like. As a result, the size and cause of deviations from consumption norms is frequently detected only when drawing up the accounts. Deviations occurring in indirect expenditures, such as shop and general plant overhead, are usually discerned by comparing actual outlays with estimated outlays.

(2) Annual consumption norms express the planned reduction per unit of output in the consumption of materials and labor as compared with the previous year. In the same manner that annual consumption norms are expected to reflect a progressive decline in consumption per unit of output from year to year, so current consumption norms, which are derived by subdividing the annual norm into four quarterly periods, are expected to reflect a similar decline

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\* For an illustration of the method of recording deviations from material consumption norms, see Appendix C.

from quarter to quarter. Actual consumption for a given month may vary within specified limits from the quarterly norm so long as the average quarterly level of consumption as shown in the plan is met during the quarter as a whole. Thus the consumption of materials or the norm-hours of labor per unit of output may be somewhat higher than the planned quarterly level in January and lower than the planned quarterly level in March. Deviations from quarterly norms occurring in a given month are shown in the monthly accounts because of their importance in analyzing the current operations of the producing plant.

The recording of periodic changes in norms to reflect changes in actual consumption is considered to be an important feature of the normative method because it points up changes in production efficiency at each producing plant and serves as the basis for setting the norms for the following plan period. Norms expressed in ruble values must be recalculated to reflect any adjustments in the prices of material inputs, wage rates, and utilities and transport rates, if the norms are to be regarded as indicators of changes in production efficiency.

(3) Deviations from current norms are usually charged in full to the cost of the output finished in the reporting period. Unfinished output is valued only at the norm cost. Soviet economists claim that this practice does not distort the cost of most finished articles inasmuch as the balances of unfinished output in mass and large-series production are more or less uniform throughout a year.

In tightening up norms from one month to the next as a means of reducing the consumption of resources, unfinished production is revalued at the beginning of each new monthly reporting period so that it will conform to normative calculations based on the new current norms.

(4) Under the normative method, consumption norms are established for types or groups of similar products. Types or groups of similar products are defined as "products with approximately the same technology of production, the same labor inputs, and the same materials composition." By establishing general categories of similar products based on the normative outlays required to produce them, the work of recording the outlays and calculating the cost of the many individual articles that may be produced at a machine building plant is simplified. In the plant's accounts, there is no attempt to differentiate between the outlays for articles that have been grouped together on the basis of their similarity.

The unit cost of the individual articles included under a given type or group is calculated and reported by the producing plant to superior organizations periodically during the year on the basis of this aggregative statistical technique.\* Any deviations from current norms that have occurred as well as any changes in the norms themselves are calculated for types or groups of articles as a whole. The normative cost is determined by a simple addition or subtraction of deviations from and changes in the norms relating to the given type or group of articles. Thus the deviations from norms and changes in norms recorded for a type or group of similar articles is used for all of the individual articles within the group when their unit cost is being calculated. Soviet economists claim that, as a rule, the deviations from the consumption norms recorded for a group of similar articles are almost uniformly applicable to each article within the group.\*\* Normative calculations may be made for both finished and semifinished articles.

b. Order Method\*\*\*

Under the order method of calculating cost, accounting is based on the individual order that is placed with a producing plant, ordinarily for a predetermined quantity of output. The actual cost of filling each order is determined only after the order has been completely filled. As a result, the period required for filling large orders and manufacturing articles that entail prolonged processing does not usually coincide with the normal Soviet monthly reporting period. From the point of view of cost accounting, the most serious defect in the order method of accounting and calculating is the delay involved in submitting adequate data on the cost of output until the month in which an order is closed. This latter defect is considered especially objectionable when a plant or shop is filling a whole series of orders requiring several months or several quarters to complete, for deviations from planned cost cannot easily be caught and remedied during the production process.

In the order method, actual outlays are recorded only for the order as a whole. A separate account bearing the numerical

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\* A sample of a monthly calculation report on the unit cost of a specific article and a sample of a worksheet on which deviations from norms have been aggregatively calculated for all articles falling within a given group of similar articles is presented in Appendix C.

\*\* Without a knowledge of the degree of difference permitted between the individual articles classed together in one or another group of so-called "similar articles," it is not possible to comment on the accuracy of this statement.

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designation of the order is opened for each order, and all outlays expended in filling the order are entered in this account. Direct expenditures are entered from primary documents, and indirect expenditures are distributed among all the orders being filled. The outlays entered in the account for the entire order, expressed both in physical units and ruble values, are merely summed to derive the total cost of the output. From these data the actual unit cost of an article is calculated.

Determination of the actual cost of partial fulfillment of an order within a given month is difficult, if not impossible, under the order system. If the cost of partial fulfillment of an order is called for, finished output is valued, not at actual cost, but at planned cost. When there is a very lengthy technological process involved in producing large and complex pieces of machinery, orders are sometimes further broken down according to complete components, if they pass through distinct stages of processing, to permit a more detailed calculation and distribution of cost on completion of the order.

The order method is an old method of accounting that, until 1930, was the principal method used in Soviet machine building. It is now used predominantly in individual and small-series production and is limited largely to shipbuilding and heavy machine building. In addition to being used for machinery and equipment produced individually or in small series, the order method is used in most Soviet machine building plants to calculate the cost of repair and installation work and the manufacture of special tools and devices.

The order method is especially applicable in the development of prototypes and experimental batches of new articles that are destined for subsequent mass or large-series production because of the many changes which may occur in the design, technology of production, and technical norms established for such articles. Only after formal documents attesting to successful production of parts and components on production lines and in shops have been drawn up and after substantiated technological norms have been established may the normative method of accounting supplant the order method in the manufacture of new articles on a mass or large-series scale.

#### c. Conversion Method\*

The conversion method of accounting and calculating cost is used in so-called mass conversion processes, where an initial homogeneous raw material (or semifinished material) undergoes bulk processing at distinct, consecutive stages. This method finds only limited application in machine building, principally in the processing

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of such materials as iron, steel, and rolled ferrous and nonferrous metals, where the technological process is brief, uniform, and repetitive.

Because of the brevity of the process involved in each conversion, all outlays connected with a conversion are recorded in full in the course of a reporting month. A calculation is made on the basis of the types and grades of articles or semifinished goods that emerge in the conversion of the material from one form to another. When several types of articles (nuts, bolts, screws, rivets, and the like) are manufactured simultaneously from one and the same material, the outlays of production are commonly distributed among the different types of articles through the use of coefficients that must be approved by planning organizations. Control over consumption norms under the conversion method is exercised through accounts that reflect the movement of the raw materials through the various phases of conversion.

In machine building the conversion method is used most extensively in foundries. Here, cost is calculated for the two principal phases of production. The first phase (or conversion) is the preparation of the molten metal, which includes the preparing, placing in the furnace, and smelting of the charge. The second phase is the manufacture of the casting, which includes the preparation and filling of the mold and the knocking out and cleaning of the casting. The conversion method also is used sometimes in forges, where the nature of the production process does not always lend itself to the normative method.

Before 1930 the conversion method followed essentially the order method in form. Since the introduction of the normative method in mass and series production, however, the accounting and calculation of cost at each phase of production under the conversion method has been patterned more closely on the principles of the normative method.

### 3. Types of Calculated Cost and Their Composition\*

#### a. General

Under Soviet procedure, two costs are calculated for the output of a machine building plant: the plant cost (fabrichno-zavodskaya sebestoimost') and the full cost (polnaya sebestoimost'). A third cost, the branch cost (otraslevaya sebestoimost'), is derived

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by averaging the full cost of a given article at all the plants that bear major responsibility for producing the article. In general, it is the planned branch cost of machinery and equipment that serves as the basis for setting prices. With increasing emphasis being placed on plant specialization in Soviet machine building, some models or types of machinery and equipment are currently produced at only one plant. In such cases, of course, the full cost at the producing plant also is the branch cost.

#### b. Plant Cost

In calculating the cost of an article or of the entire output of a plant, the following seven items\* make up what is called "plant cost" in Soviet machine building.

(1) Expenditures for the purchase of materials -- principally metal in machine building -- depend primarily, of course, on the price and quantity of materials required to meet the production program of the plant. Transportation and handling costs (transportno-zagotovitel'nyye raskhody) connected with the procurement, storage, preliminary processing, and intraplant distribution of basic materials, however, also are included under this item. In computing the consumption of materials, the value of reusable scrap (determined by its ultimate disposition) is subtracted from the initial cost of work pieces bought in the rough. The cost of finished and semifinished goods purchased from other plants also may be included in this item.

(2) Fuel used directly in the production process, including fuel used for smelting iron and steel in the plant foundry and for heating metal in the forges and in the heat-treating shops.

(3) Electric energy used directly in the production process, including electric energy consumed by electric furnaces in foundries and in the welding, galvanizing, and heat-treating shops.

\* The decree "Basic Principles of Planning, Recording, and Calculating the Cost of Industrial Output," approved in 1955 by Gosplan, USSR; the Ministry of Finance, USSR; and the CSA, USSR, provided for a simplified itemization in calculating the cost of standard products. Some machine building plants itemize expenditures in greater detail than is done in this report. For example, when expenditures connected with setting up a new production line are sufficiently large, they may be separately itemized rather than being lumped under "shop expenditures" as in this example (see (6), (d), p. 25, below).

(4) Wages paid to production workers. In reporting cost, only wages paid for work already completed are included. Supplemental wages paid to production workers, even though not envisaged in the plan, are included when calculating actual cost. The size of a worker's wage is determined by the norm governing his work, the category of his work, and the wage rate for that category of work.

(5) Deductions for the social insurance of production workers are paid by enterprises on a direct percentage basis in relation to wages. The size of these payments is established by the government on the basis of working conditions. Within the various branches of machine building, the size of payments for social insurance ranges from 7.2 to 8.5 percent of the wages.

(6) Shop expenditures which include the following:

(a) The overhead costs of operating the shop, including the wages of the shop management, engineers and technicians, office workers, junior service personnel, and auxiliary workers as well as shop maintenance, intrashop transportation costs, safety measures, and the like.\*

(b) Expenditures for the maintenance and operation of equipment, including lubricants and abrasives; energy used to drive motors for purposes not directly connected with the production process; the wages of setup men, oilers, and repair men; and amortization of shop equipment.

(c) Depreciation of special cutting tools and accessories, including the cost of repair and preventive maintenance of such tools and accessories. Special related expenditures, including outlays for the testing of finished articles when such testing leads to full depreciation of special tools and accessories.

(d) Expenditures arising from the services required of design bureaus, testing stations, or plant laboratories in production of individual articles.

(e) Costs incurred in setting up mass and series production of new types of articles,\*\* including any or all of the

\* When calculating the actual (as opposed to the planned) cost of output, the following expenditures are allocated to shop expenditures: idle time chargeable to the shop (including fuel and energy used during a period of idleness); shortages of and damages to assets; and losses arising from the underutilization of parts, components, cutting tools, and attachments that have been modernized.

\*\* This item refers, of course, only to that portion of the cost of new articles incurred directly by the shop. Specialized design bureaus and institutes attached to state [footnote continued on p. 26]

following expenditures: the designing of new articles and the development of the technological process for producing them; the testing of materials, semifinished goods, cutting tools, and attachments required for production of new articles; the manufacture of prototypes; the redesigning and rearrangement of equipment (exclusive of centrally allocated capital outlays) required for production of new articles; and the difference between the actual and planned cost of the first batch of articles manufactured in the process of setting up production.

(f) Losses from rejects, which reflect outlays for production of components, parts, or articles that are rejected because of defects as well as outlays for work connected with eliminating the source of defective articles. Losses from rejects include the following: the cost of the materials expended for rejected parts less the value of the reusable part of the materials, the base and supplemental wages as well as deductions for social insurance of those workers who were engaged in the processing of defective parts up to the time of discovery of the defect as well as the wages and insurance of those workers who are engaged in trouble shooting, shop expenditures allocable to the rejected articles, and expenditures for the repair or replacement of parts of an article that is sold under a guarantee, if the article breaks down before the expiration date of the guarantee. Excluded in calculating losses from rejects is the value of the price at which rejected articles can be sold for limited use as well as the pay withheld from the wages of those responsible for rejected articles.

(7) General plant expenditures, which include overhead expenditures not specifically allocated to shops or other departments of the plant, such as outlays for the management of the plant; amortization of buildings and equipment not subject to

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scientific and research organizations also engage in research and development, some of which is financed from the state budget. The plant also may have a design bureau. To determine all the outlays that a shop (plant) expends in setting up production, a special estimate is drawn up for each new article. All the expenditures connected with setting up production are allocated to the cost of producing the new article during a 2-year period, dating from the manufacture of the first batch. The length of this period may be extended only by securing special permission from higher authority. In this way, part of the expenditures connected with setting up production of new articles is written off during the first year of production, and the remainder is written off in the following year.



amortization at the shop level; maintenance of the plant's grounds; personnel on detached duty; and office, postal-telegraph, and transportation expenditures. When determining the actual cost (as opposed to the planned cost) of output, the following penalty charges are included under general plant expenditures: fines paid by an enterprise for demurrage, for failure to meet scheduled deliveries, for losses in production resulting from a shortage of assets and unfinished production, and for overdue payments on loans.

It may be seen from the items which are included in the calculation of plant cost that all of these costs are incurred in the production process at the plant. Items (6) (shop expenditures) and (7) (general plant expenditures) include all the overhead costs incurred at the plant.

c. Full Cost

The full cost of an article or of a plant's output is computed by adding to the plant cost certain expenditures that are not directly connected with the production process. Among these so-called nonproductional expenditures\* are the following:

(1) Expenditures incurred in packaging, crating, and transporting articles to the station of shipment.\*\*

(2) Payment for the services of sales organizations.\*\*\*

(3) Contributions by the plant (on a pro rata basis) for the maintenance of organizations above it in the administrative hierarchy, such as combines, trusts, administrations, and departments.

(4) Funds paid by the producing plants to help defray the cost of centralized programs affecting the machine building industry as a whole, such as scientific-research work, personnel training programs, and the standardization of articles.

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\* Vneproizvodstvennyye raskhody -- literally, "extraproductional expenditures."

\*\* The domestic prices of machinery and equipment in the USSR are ordinarily quoted f.o.b. (free on board) station of shipment.

\*\*\* Ordinarily machinery and equipment are sold by the producing plant directly to the using plant in the USSR. Before the 1957 administrative reorganization of industry and construction, however, antifriction bearings, for example, were sold through the All-Union State Trust for the Sale of Bearings.

Nonproductional expenditures account for only a very small share of full cost, the major share comprising the plant cost. The calculation of the unit cost of an article and of the cost of the entire output of an individual machine building plant, however, is based on full cost.

d. Branch Cost

The calculation of the full cost of an article has been discussed as it relates to individual producing plants. It should be noted, however, that where several machine building plants are producing the same article, the full cost at the individual plants will vary in accordance with the specific conditions of production obtaining at the respective plants. In such cases, rather than setting a different price at which each plant will sell the article, a single nationwide price is set on the basis of the branch cost of the article. The branch cost is an average of the full cost of producing the article at all plants within the branch of machine building that bears the major responsibility for producing it. The branch cost of an article, however, is not a simple arithmetic average but a weighted average, for the sum of the outlays of all the individual producing plants is used to derive the full cost of producing the given quantity. On the assumption that the planned physical volume of output is produced at the planned cost and sold at the fixed price, the branch of machine building in question is assured of recovering the full cost of the article plus its planned profit, even though one or more of its individual plants may produce the article at a planned loss.

Although the planned cost of producing an article at a given machine building plant is used as a check on the efficiency of that plant in meeting its cost targets, the planned branch cost of an article is used as a measure for comparing the relative efficiency of production at all plants that produce the same article. Excessively high costs at an individual plant, such as exist when a plant first begins to produce an article already in full production at other plants, may temporarily be excluded in the calculation of branch cost. In such cases the initial high costs connected with setting up production at the plant are charged off when full production is established and the cost is more nearly in line with that of other producers of the article. It is probable that in the current Soviet campaign to concentrate production of given types of machinery and equipment in the minimum number of plants conducive to realizing the maximum benefits of specialization, branch cost data are considered in allocating production responsibilities to the most efficient producers. Where production of a specific type or model of machinery or equipment is concentrated at a single plant in the USSR, however,

the state planners and administrators have no comparative basis for judging whether or not the article is indeed being produced at the plant which can produce it most efficiently.

Because of the Soviet practice of establishing uniform national prices on important industrial goods, the unit cost of most of the materials used in machine building is the same throughout the USSR. The price of metal in the USSR, for example, is quoted f.o.b. station of destination, which means that transportation costs have been taken into account in establishing a uniform national price on metal. This practice, in itself, tends to obscure advantages in production of machinery and equipment arising from the location of a producing plant near the source of raw materials. Although the establishment of branch costs for articles in Soviet machine building is designed to limit production of articles to officially designated plants (production of such articles at unauthorized plants presumably results in unprofitable production for the plants), many plants when faced with a shortage in the supply of parts or components from the designated producers are forced to choose between manufacturing their own parts and components at a financial loss or failing to meet their production goals.

### III. Level of Cost

#### A. Planning

##### 1. Centralized\*

The level of cost within the Soviet economy is planned on a national scale at the time that the national economic plan is formulated and approved. Planning by centralized state agencies has undergone several significant changes since the 1957 reorganization of the administration of industry and construction and the subsequent adoption of the Seven Year Plan (1959-65).

With the replacement of practically all of the military machine building ministries by state committees under the Council of Ministers, USSR, and of the civilian machine building ministries by departments in the all-union and union-republic gosplans (with corresponding administrations, as appropriate, in the regional economic councils), the role of Gosplan, USSR, in establishing the cost targets of the national economic plans has been strengthened. Whereas the former ministries exerted a strong influence on the final cost targets adopted by Gosplan, USSR, the present regional economic councils, because of their multiplicity and dispersion, are not in such a favorable position.

Among other criticisms leveled against the former ministries was the charge that, in planning cost for the plants administratively subordinate to them, the ministries approached the matter in a purely mechanical way without investigation of the real opportunities for reducing cost at individual plants. As a consequence, the level of planned cost allegedly was sometimes inflated at the producing plants, and the plants were permitted to make unwarranted profits by selling at prices established on the basis of such inflated planned costs. The present machine building administrations of the regional economic councils, it is maintained, are sufficiently close to the producing plants to ascertain that the cost plans assigned to the plants conform more closely to theoretically substantiated opportunities for reducing costs.

Following the adoption of the Seven Year Plan, increased emphasis has allegedly been placed on annual targets as integral parts of long-term plans rather than as separately conceived goals based on actual performance in the preceding year. In drawing up long-term plans (5, 7, or more years), targets are established not only for the terminal year of the plan but for each individual year included in the plan as well. The target figures established for each given year are

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referred to as "annual targets of the long-term plan." It is claimed that this method of planning eliminates the necessity of drawing up annual plans at the approach of each new year, a practice which involved using incomplete data from the current year as a basis for drawing up the new plan and which sometimes left the economy operating without a firm plan during the interim between the drafting and approval of the new annual plan. It is maintained that, by establishing in advance targets for all years of the long-term plan, the economy operates continuously under a plan, annual plan targets being merely adjusted where necessary to take care of deviations from the plan in the preceding year:

The planning of the national economy is now based on long-term plans broken down into annual targets by branch of industry, union-republic, administrative economic region, enterprise, and construction project. The plans drawn up by enterprises, construction projects, regional economic councils, ministries, or other governmental departments are based on the control figures of the long-term plans worked out by Gosplan USSR with the assistance of Gosplans in the union-republics and ministries and departments of the USSR and approved by the Central Committee of the CPSU and the Council of Ministers, USSR. 13/

When the government corrects annual targets in the long-term plan, corresponding changes are made in the plans of the union-republics, the ministries and departments of the USSR, the regional economic councils, and finally the producing plants.

Starting with aggregative data on production, construction, labor, materials, technical equipment, and finances, the central planners establish control figures for the development of the national economy. In planning costs and prices on a national scale, the state planners rely primarily on norms to relate resources to the planned volume of output. The four major types of technical-economic norms used in establishing this correlation are as follows:

- a. Norms governing the utilization of equipment and productive capacity.
- b. Norms governing the consumption of materials (including processed materials, fuel, and electric energy).

c. Norms governing labor inputs in the manufacture of the major types of products.

d. Norms expressing a ratio between the amount of technical equipment installed and the number of production workers (tekhnicheskaya vooruzhennost').

Once the available resources have been apportioned among industries and administrative areas, the appropriate targets are disseminated to the various union-republics and administrative economic regions, where they are further elaborated in terms of the particular industries located in each jurisdiction. Finally the individual plant receives its targets, the implementation of which is worked out in the plant's tekhpromfinplan. Throughout this entire process, all physical targets must be reconciled with the central control figures pertaining to the level of cost and reductions in cost contained in the state plan.\*

## 2. Plant\*\*

The planning that goes on above the plant level involves only major aggregative control figures. To the extent that the plants themselves coordinate the various major goals disseminated to them from above, it may be said that there is an element of decentralized planning in the USSR. Using the standard forms and methodologies provided by the state planning and statistical agencies, the individual producing plant works out its over-all plan of operation, the tekhpromfinplan, in which every activity is detailed. The tekhpromfinplan contains data on the volume of output; on the growth of technology; on the utilization of equipment, floorspace and manpower; on labor productivity and wages; on deliveries of materials and technical equipment; on cost; on financing; and on capital construction. The result is a program of coordinated indexes. Indexes governing the plant's production program are detailed in physical terms and corresponding ruble costs.

Under the present organization of planning, the cost plan of a plant is an integral part of the tekhpromfinplan. The tekhpromfinplan elaborates in specific detail how the cost plan is to be met

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\* Although the exact procedure followed in the centralized planning of cost in the USSR has not been comprehensively described in Soviet sources, acquisition in the West of the 1941 State Plan for the Development of the National Economy of the USSR provides insight into this subject (see Appendix D).

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in each phase of the plant's operation. The over-all performance of the plant is therefore reflected in the cost plan, which reconciles all the component parts of the production program of the plant. During any given period a comparison of the reported level of cost at a plant with the planned level of cost reveals at a glance the over-all performance of the plant in meeting its indexes. Because the cost plan is a composite plan of the plant's activities, it reveals in what respect the plant may be deviating from the plan.

It is through the cost plan that the primary elements in the estimate of production are reconciled with the items of calculation, as these costs are computed in different ways and must be kept in balance throughout the planning process. It is also through the tekhpromfinplan that the estimate of the outlays of production is linked with the volumes of gross and commodity output, with the plan of material-technical supplies, the labor plan, and the organizational and technical plan (orgtekhplan). A decree of the Central Committee of the Communist Party (CPSU) and the government made it mandatory, beginning in 1959, for enterprises to complete by no later than 15 November of each year the annual program for the following year, based on adjustments made in the annual control figures of the national long-term plan and showing all indexes broken down by quarterly and monthly periods.

#### B. Commodity Output\*

##### 1. General

In establishing the level of the cost of output, Soviet planners use commodity output rather than gross output for several reasons. First, commodity output includes only production of explicit goods and services that are designed to enter into the national turnover during a given period, whereas gross output in certain cases includes some intraplant turnover and in a number of branches of industry with long lead times (such as the machine building industry) includes the difference in unfinished production on hand at the beginning and at the end of the period as well as some intraplant turnover. Second, in planning the level of cost, a major consideration is the planned reduction in the unit cost of articles that have been in production during the previous period. The level of cost of all such goods is planned by establishing the new level of cost as the difference between the existing level of cost and the planned reduction in cost. Commodity output is preeminently suitable for this purpose because the norms relating to established goods and services included in commodity output provide a convenient method of computing reductions in the unit cost of all such goods and services compared with the previous year. The level of the cost of new articles included in commodity output cannot, of course, be

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calculated from changes in norms and planned reductions in unit cost compared with the previous period simply because these articles were not produced in the previous period. Consequently, in calculating the level of cost of commodity output, the output is divided into two categories, the costs of which are calculated separately and then added together -- comparable output (sравнимая продукция) and noncomparable output (несравнимая продукция).

## 2. Comparable Output

Comparable output includes all articles in the commodity output of a plant that are in at least their second consecutive year of production. In machine building, comparable output may include finished articles, parts, and semifinished goods as well as services and work recurrently performed for other plants and organizations. Partial changes in the technology of manufacturing or in the design, operation, equipping, material composition, or exterior finish of an article already in production do not invalidate the comparability of the article unless such changes are accompanied by the issuance of new technical specifications or state standards.

The planning of the level of cost of comparable output in Soviet machine building depends to a large degree on the collection and analysis of statistical data pertaining to production in the period previous to the plan period. In general, the Soviet system assumes that the unit cost of comparable output will be reduced successively from one year to the next.

In planning the cost of comparable output, the level of cost is expressed as an absolute ruble value and also as a percentage change in comparison with the actual level of cost in the previous year. To derive the level of cost of comparable output in the plan period, the number of units of each article to be produced is multiplied by the planned unit cost. The level of cost of comparable output in the previous year is derived by multiplying the number of units of each article to be produced in the plan period by the annual average unit costs actually reported for these articles in the previous period. The relationship between the levels of cost in 2 successive

years may be expressed by the ratio  $\frac{q_2 c_2}{q_1 c_1}$  and the percentage change in

the level of cost, by the formula  $\frac{q_2 c_2 - q_1 c_1}{q_1 c_1}$ , where

$q_2$  = volume of output in the second year,

$c_2$  = unit cost of output in the second year, and

$c_1$  = unit cost of output in the first year.



Reductions in the level of cost of comparable output in machine building may reflect economies of production achieved in machine building itself or reductions in the prices of the materials and services supplied by other industries. In the first case, economies of production may be realized in machine building through reductions in the unit consumption of materials and labor, through a reduction in overhead costs per unit of output, through a more rational use of production facilities, through mechanization and automation of production processes (including materials handling), and the like. Reductions in the prices of materials and services required for production in machine building may result from economies achieved in the metallurgical, fuel, electric energy, and transportation industries. Reductions in such costs may be partly offset, of course, by increases in wages and amortization rates in machine building.

Soviet announcements concerning percentage changes in the cost of output in machine building may be misleading to the layman insofar as they sometimes appear to apply to the entire commodity output. In some industries, such as the mining, oil extraction, and lumbering industries, where allegedly 90 to 100 percent of the output is comparable from one year to the next because of its homogeneous nature, percentage changes announced in the cost of commodity output may, in fact, apply to virtually the entire output. In machine building, however, where each year witnesses the introduction of a relatively large number of new articles, data concerning the planned change in cost apply only to slightly more than half of commodity output.

### 3. Noncomparable Output

Noncomparable output includes articles which have never before been produced at a plant (even though they may have been produced at other plants) as well as articles which have been previously produced only on a sample basis. If there is some question as to whether an article belongs in comparable or noncomparable output, the matter is referred to the appropriate planning agency at a higher level.

In planning the level of cost of noncomparable output, costs are necessarily estimative in nature and are established only for the plan period. When an article has not previously been manufactured and when norms have not been established for its production, there is no substantiated basis for setting the level of cost.

Under Soviet conditions, the principal factors that determine the estimated unit cost of an article are the prices and quantities of inputs, on the one hand, and the number of units produced, on the other. Although prices of inputs are generally no problem in

estimating the cost of new articles inasmuch as they are generally established for rather prolonged periods, sometimes an unforeseen change in these prices requires that the estimated cost be recalculated. More of a problem, in the absence of established norms, is the accurate estimation of the physical inputs required. Estimation of the number of new articles that will be manufactured in the first year of production also is subject to error, especially if all the difficulties connected with the setting up of production have not been resolved at the time that the plan is drawn up. Because unit cost in mass or series production varies with the number of units produced, a delay in the starting up of production or an unanticipated interruption in production may cause a fewer number of units to be produced than was planned. Failure to produce the planned number of units may lead to a higher unit cost than estimated in the plan. With new articles the incidence of rejects also is apt to be high, and the unit cost of production may rise accordingly.

Because of the Soviet policy of charging off the developmental costs and the costs of setting up production incurred by a plant to the cost of new articles in the initial period of their mass or series production,\* the level of cost of new engineering products is relatively high in the USSR, and, consequently, noncomparable output accounts for a sizable share of the total cost of commodity output. In fact, it may safely be said that noncomparable output accounts for a higher percentage of the total cost of commodity output in Soviet machine building than in any other Soviet industry.\*\*

Soviet economists claim that in estimating the cost of new articles it is common practice to work from analogy with the cost of articles already in full production. Even so, problems inherent in planning the level of cost of noncomparable output apparently leave room for wide margins of error. To judge from cases cited in the Soviet press, enterprises are guilty of "padding" the estimated costs of new articles, not only to cushion themselves against unforeseen contingencies but also with the conscious intent of making high profits for the enterprise "at the expense of the economy as a whole." Because of their very nature, estimates of cost for new articles to some degree have been exempt from the rigorous standardized controls of costing norms. An increasing effort is being made, however, to

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\* See the second footnote on p. 25, above.

\*\* Some of the problems of interpreting published data on the reduction of cost in Soviet machine building are discussed in D, p. 42, below, where the influence of the relative sizes of comparable and noncomparable output on the cost of commodity output is analyzed.

bring such estimates under the closer scrutiny and control of central agencies as well as to develop a more standardized methodology for drawing up estimates.

C. Reporting\*

Data on the level of cost are included in the monthly and quarterly report submitted by Soviet plants on Form 3-P: Report of an Industrial Enterprise on Fulfillment of the Plan Pertaining to the Cost of Commodity Output. The titles of the various sections of this report are as follows:

1. Fulfillment of the Plan for Reducing the Cost of Comparable Output and for the Cost of Total Commodity Output
2. The Cost of Comparable Output and Total Commodity Output by Items of Calculation
3. The Influence on Cost of Changes in Prices of Materials and Fuel
4. Losses from Defective Goods
5. The Unit Cost of Major Types of Output
6. Outlays for Production Exclusive of Intraplant Turnover

The data appearing in Sections 1 and 2 of Form 3-P also are summarized for the year in the annual report submitted on Form 6: The Cost of Commodity Output. Because Sections 1 and 2 of Form 3-P provide the most salient data for purposes of centralized accounting and control, examples of these two sections are shown in Tables 1 and 2.\*\*

In Table 1, several costs have been computed for comparable output and total commodity output in March 1957 and in the entire first quarter of 1957 by multiplying the physical units of output in the respective periods first by the average annual unit cost\*\*\*

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\*\* Tables 1 and 2 follow on pp. 39 and 40, respectively. Data are hypothetical.

\*\*\* Text continued on p. 41.

USSR: Example of Report Submitted by an Industrial Enterprise on Reducing the Cost of Comparable Output a/  
and on the Cost of Total Commodity Output b/  
March 1957 and First Quarter 1957

Table 1

Thousand Rubles								
Time Period	(1) Planned Percentage Change in Cost	(2) Expressed in Average Annual Cost of Previous Year	Comparable Output			Total Commodity Output c/ (Comparable and Noncomparable Output)		
			(3) Cost According to Quarterly Plan	(4) Actual Cost	(5) Actual Percentage Change in Cost d/	(6) Cost According to Quarterly Plan	(7) Actual Cost	(8) Savings From Reduction of Cost in Excess of Plan
For March 1957	-9.2	6,233	5,770	5,245	-15.9	5,875	5,397	478
For the first quarter of 1957	-9.2	17,625	16,072	15,232	-13.6	16,354	15,551	803
For the period since the beginning of the year	-9.2	17,625	16,072	15,232	-13.6	16,354	15,551	803

a. Comparable output consists of those goods and services produced in a given year that were also produced in the preceding year. Non-comparable output comprises the residual of commodity output.

b. Based on Section 1 of Form 3-P: Report of an Industrial Enterprise on Fulfillment of the Plan Pertaining to the Cost of Commodity Output, using hypothetical data.

c. When submitted at the end of a quarter, this report also gives the value of commodity output in enterprise wholesale prices. In this example, commodity output was valued at 18,056,000 rubles, including 17,660,000 rubles of comparable output and 396,000 rubles of noncomparable output.

d. Column (4) minus Column (2) divided by Column (2).

Table 2

USSR: Example of Report Submitted by an Industrial Enterprise on the Cost of Comparable Output a/  
and the Cost of Total Commodity Output, Distributed by Items of Calculation b/  
First Quarter 1957

Items of Calculation	Thousand Rubles			
	(1)	(2)	(3)	(4)
	Comparable Output Expressed in Average Annual Costs of Previous Year	Actual Cost	Total Commodity Output (Comparable and Noncomparable Output)	Actual Cost
Raw and processed materials	6,272	5,221	5,537	5,314
Fuel and energy	659	290	431	295
Basic wages	2,091	1,966	2,091	2,038
Supplementary wages	1,587	1,231	1,447	1,258
Expenditures connected with setting up production	57	17	13	17
Losses from rejects	318	253	81	254
Shop expenditures, including expenditures for maintaining and operating equipment	4,761	4,622	5,055	4,727
General plant expenditures	1,706	1,448	1,517	1,463
Plant cost of commodity output	<u>17,451</u>	<u>15,048</u>	<u>16,172</u>	<u>15,366</u>
Nonproductional expenditures	<u>174</u>	<u>184</u>	<u>182</u>	<u>185</u>
Full cost of commodity output	<u>17,625</u>	<u>15,232</u>	<u>16,354</u>	<u>15,551</u>

a. Comparable output consists of those goods and services produced in a given year that were also produced in the preceding year. Noncomparable output comprises the residual of commodity output.

b. Based on Section 2 of Form 3-P: Report of an Industrial Enterprise on Fulfillment of the Plan Pertaining to the Cost of Commodity Output, using hypothetical data. This information is calculated for the quarter in reports submitted in March, June, and September and is otherwise calculated for the month.

that obtained in the previous year (Column 2), then by the unit cost called for in the quarterly plan (Column 3), and finally by the actual unit cost as determined by cost calculation in the plan period (Column 4). The level of cost computed from unit costs in the previous year (Column 2) is subtracted from the actual level of cost (Column 4). The difference between these two levels of cost is divided by the level of cost in the previous year (Column 2) to derive the percent by which the cost of comparable output was reduced during the period reported on (Column 5). The actual percentage reduction in the cost of comparable output may be compared with the percentage reduction planned for the period (Column 1).

The actual cost of total commodity output (Column 7), which is the sum of the actual cost of comparable and noncomparable output, is compared in Section 1 with the planned cost of total commodity output in the same period (Column 6) to determine the size of savings or excessive expenditures in relation to the plan. Although there is no space provided for reporting and comparing the planned and actual cost of noncomparable output, the difference can easily be computed by subtracting, respectively, the planned and actual cost of comparable output (Columns 3 and 4) from the planned and actual cost of total commodity output (Columns 6 and 7). In this hypothetical example, taken from a Soviet source, the planned cost of noncomparable output for March 1957 was apparently 105,000 rubles,\* and the actual cost was 152,000 rubles. It should be observed that the size of savings or excessive expenditures in the actual cost of all commodity output (Column 7) compared with the planned cost (Column 6) may, in Soviet machine building, often be attributable to faulty estimates of the cost of new articles (noncomparable output).

Section 2 of Form 3-P (Table 2) shows the distribution of the planned and actual cost of commodity output (Columns 3 and 4) among the items of calculation, thereby pinpointing sources of deviation from the plan. In a similar manner the cost of comparable output is distributed among the items of calculation, and the actual cost recorded for each item (Column 2) is shown in juxtaposition with the cost expressed in average annual costs of the previous year (Column 1). From these data the reduction in cost of each item used to calculate comparable output may be computed. In effect, Section 2 (Table 2) supplements certain of the aggregative data contained in Section 1 (Table 1).

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\* Most ruble values shown in this report are hypothetical, and, consequently, there is no necessity of a conversion factor for converting rubles to US dollars. The only exception is to be found in Tables 8 and 9, pp. 84 and 85, respectively, below, where ruble values are expressed in 1941 rubles. The ratio between 1941 rubles and 1941 US dollars was 5.3 to 1.

#### D. Published Soviet Data on the Change in Cost\*

##### 1. General

The two published Soviet indexes on the change in cost of industrial output (izmeneniye sebestoimosti promyshlennoy produktsii), including machine building output, have for some years been based on the change in the annual unit costs of comparable output.\*\* Both indexes are link indexes, so that data for each year in the series are related only with the data for the preceding year. In one index, however, the influence of changes in the prices of the material inputs of production are reflected in the change of cost from one year to the next, and in the other index this influence is excluded by using uniform prices for material inputs in each of the two years for which costs are being related. Accordingly, the first cost index, entitled "in the current prices of each year" (v deystvuyushchikh tsenakh sootvetsvuyushchego goda), reflects total changes in cost in money terms, whatever the source. The second index, entitled "in prices comparable with the previous year" (v tsenakh, sopostavimyykh s predydushchim godom), by reflecting changes in inputs, thereby reflects changes in real cost. Beginning with 1959, there was introduced a new cost index, one that covers the entire commodity output and not just comparable output. This index is based on "outlays per ruble of commodity output (zatraty na rubl' tovarnoy produktsii)."

Some explanation of the various factors that influence these indexes is a necessary prerequisite to evaluating their significance and usefulness.

Where Soviet indexes showing annual changes in the level of cost of commodity output pertain only to comparable output, the size of such output in relation to total commodity output in any given industry and in Soviet industry as a whole is of some consequence. The composition of commodity output in Soviet machine building is marked by relatively rapid change from one year to the next as some articles drop out and others enter into production. According to the 1941 state plan, the share of comparable output in the commodity output of individual machine building industries in that year was to range between 64.9 and 87.0 percent, a percentage conspicuously below that planned for other industries.\*\*\* Since 1941 the share of comparable output in commodity output has declined even further in the machine building industries. With comparable output accounting for as little

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\*\* The method of computing annual percentage changes in the cost of comparable output using unit cost data is described in B, 2, p. 35, above.

\*\*\* See Appendix D.

as 25 to 30 percent of commodity output in those areas of machine building where small series and individual unit production predominate, the share of comparable output in commodity output for machine building as a whole was said, in 1957, to average between 50 and 60 percent.

Among Soviet industries, machine building is generally credited with registering one of the highest, if not the highest, percentage annual reductions in the cost of comparable output. This phenomenon is generally attributed by Soviet economists to the sizable annual reduction in unit costs of comparable output that may accompany expanded scales of production, rises in productivity, and the marked declines in the unit cost of new articles after the cost of designing, testing, and tooling for production has been written off as an item in their production cost. There is no published index available since the end of World War II on annual reductions in the cost of comparable output for Soviet machine building as a whole, although it is claimed that under the Fifth Five Year Plan (1951-55) average annual reductions ranged between approximately 8 and 10 percent in the machine building industries. Data on annual changes in the cost of comparable output in machine building and industry as a whole for the years 1929/30 - 1958 are given in Table 3.\* More recent data on percentage changes in the cost of comparable output in two branches of machine building are tabulated below (presumably based on prices comparable with the previous year).

Year	Percent	
	Electrotechnical Industry	Motor Vehicle Industry
1947	-8.1	N.A.
1948	-12.9	N.A.
1949	-12.3	N.A.
1950	-7.9	N.A.
1951	-8.0	N.A.
1952	-8.8	N.A.
1953	-6.9	N.A.
1954	-5.5	N.A.
1955	-7.4	-11.4
1956	-9.1	-10.2
1957 (Plan)	-5.6	N.A.

\* Table 3 follows on p. 44.



Table 3

USSR: Annual Percentage Change in the Cost of Comparable Output a/  
in Machine Building and in Industry as a Whole  
1929/30 - 1958

Percent <u>b/</u>		
<u>Year</u>	<u>Machine Building</u>	<u>Industry as a Whole</u>
1929/30	-12.1	-6.8
1931	-5.5	+1.4
1932	-6.0	+4.7
1933	-12.3	+0.5
1934	-12.2	-3.7
1935	-7.2	-4.1
1936	-1.2	-4.0
1937	-6.0	-0.1
1938	N.A.	N.A.
1939	N.A.	N.A.
1940	N.A.	-1.5
1941	-24.0	-6.9
1942	-17.0	-5.9
1943	-9.0	-2.5
1944	-9.8	-3.0
1945	N.A.	+0.9
1946	N.A.	+0.7
1947	N.A.	-2.0
1948	N.A.	-8.6
1949	N.A.	-6.8
1950	N.A.	-5.4
1951	N.A.	-5.4
1952	N.A.	-4.4
1953	N.A.	-3.7
1954	N.A.	-3.2
1955	N.A.	-4.6
1956	N.A.	-2.9
1957	N.A.	-2.6
1958	N.A.	-3.1

a. Comparable output consists of those goods and services produced in a given year that were also produced in the preceding year. Noncomparable output comprises the residual of commodity output.

b. Based on prices comparable with the previous year.

The comparable output of machine building, although accounting for a smaller percentage of commodity output than is the case in other Soviet industries, is relatively high in value and consequently constitutes a significant percentage of the total comparable output of industry as a whole.\* For this reason, changes in the annual level of cost of comparable output in machine building have a marked influence on the annual percentage change in the cost of comparable output for industry as a whole. The Soviet index on the change in cost of the comparable output of industry as a whole may be compared in Table 3 with available data on machine building. It may be noted that in all but one year (1936) for which data are available for both indexes, annual reductions in machine building have been much larger than reductions in industry as a whole. Of course, the influence of the machine building index on the index for industry as a whole is directly dependent on the share of machine building in the total comparable output of industry. If, as appears likely, this share is gradually declining, just as within the total commodity output of machine building the share of comparable output is declining, then machine building may exert less influence on the index for industry as a whole than it previously did. It may be pertinent to point out in this context that, although cost in Soviet industry was to have been reduced 25 percent under the Fifth Five Year Plan and was reported to have been actually reduced only 23 percent, the planned reduction under the abortive Sixth Five Year Plan (1956-60) dropped to 17 percent, and under the current Seven Year Plan (1959-65) the reduction is to be "no less than 11.5 percent."\*\*

## 2. Methodological Problems

Although the index of change in the cost of comparable output has long been the accepted official index governing the qualitative performance of plants and industries in the USSR, this index has been criticized by Soviet economists on a number of grounds. One major criticism has been the failure of this index to take account of the cost of noncomparable output, especially in industries such as

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\* It should be noted, however, that the share of machine building in the comparable output of industry is considerably less than its share in the total commodity output of industry. In the 1941 Plan, for example, the machine building industries accounted for about 24 percent of the total commodity output of industry but only about 18 percent of the comparable output of industry (see Appendix D, Table 8, p. 84, below).

\*\* This target figure presumably is based on the new index showing the decline in outlays per ruble of commodity output.

machine building, where such output constitutes a relatively large share of commodity output. It is pointed out that there is little basis for comparing machine building indexes, which may embrace only 50 to 60 percent of commodity output, with indexes for the extractive industries, the food industry, and the timber industry, where the high degree of homogeneity of output from year to year leads to inclusion of 90 to 100 percent of commodity output.

Another major criticism has been that in an industry such as machine building, where a large number of new articles (noncomparable output) pass over into comparable output each year, the index overstates actual reductions in cost relative to industries where output is largely uniform from year to year. Because of the formula that is used to compute the index of change in cost,\* drastic reductions in the unit cost of newer articles, which occur when all plant costs connected with their development have been written off and when production is normal, introduce a strong downward bias in the cost of comparable output as a whole. Because the cost of comparable output in any given year is directly influenced by the number of newer articles programed for a particular plant or industry in the several years previous, this index has been criticized as not being an objective measure for evaluating the relative performance of individual plants or industries with respect to economizing on state resources.

Another objection has been that the criterion for determining comparable output in machine building has militated against improvements in the quality and composition of comparable output because of the adverse effect which such improvements may have on the cost of comparable output. In an effort to include as large a number of articles as possible in the comparable output of machine building from one year to the next, articles that are roughly the same from the consumer's point of view (but for which the design, the technology of production, the finish, the materials composition, and the like may be modified without any change in specifications or state standards on the production side) are treated as comparable output. When such changes lead to an increase in the unit cost of an article, plants are hesitant to make changes -- even in the interest of improving the quality and composition of output -- because such changes tend to raise the cost of comparable output as a whole. The use of the group method in the normative calculation of unit costs in machine building (that is, the summing up of all the outlays expended for a group of similar articles) means that any substantial increases in outlays connected with changes made in one or more articles in the group are recorded as deviations for the group as a whole and may be

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\* For the formula used for computing the index of change in cost, see p. 35, above.

reflected in the respective unit costs of the articles, thus leading to an increase in the cost of all articles in the group compared with the previous year. Soviet economists argue that the practice of including articles in comparable output in spite of modifications which may lead to increased unit costs of production discourages that improvement in the quality and assortment of articles for which the regime is constantly pressing on behalf of the economy as a whole.

Other criticisms include the following points. The machine building index of change in cost, being limited to comparable output, is not organically related to indexes of growth in physical volume of output, labor productivity, and profitability, all of which are based on total output. Because of the annually changing composition of output in machine building, it is virtually impossible to construct a meaningful base-year index for this industry in planning or recording reductions in cost over a period of 5 years or longer (the existing link index admittedly does not reflect the absolute measure of savings realized from reductions in cost).

In view of the shortcomings of the index of change in cost, instructions were issued as early as 1955 by Gosplan, USSR; the Ministry of Finance, USSR; and the CSA, USSR, requiring that the following three measures be used to establish fulfillment of the cost plan: (a) the index of change in cost, (b) the plan for the cost of total commodity output, and (c) the plan for the unit cost of articles of major importance. The desire to have a single comprehensive index for measuring changes in the cost of total commodity output, however, finally led to the adoption under the Seven Year Plan of an index showing reductions in outlays per ruble of commodity output (expressed in enterprise wholesale prices)\* as the only official index of cost in the national economic plan.\*\*

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\* This ratio may be expressed by the following formula:

$$\text{Outlays per ruble of commodity output} = \frac{q_1 c_1}{q_1 p_1} \text{ where}$$

$q_1$  = commodity output in units,

$c_1$  = unit cost of output, and

$p_1$  = wholesale enterprise price per unit of output.

\*\* The index of change in the cost of comparable output is now used only at the discretion of local planning and administrative organizations.

According to its proponents, the principal merit of the index of change in outlays per ruble of commodity output compared with the index of change in cost is that it covers the entire range of commodity output. This feature is advantageous in evaluating the qualitative performance of plants and industries in that it provides a uniform measure of comparison in all cases. The effect of drastic reductions in unit cost when new articles enter normal production is less pronounced in this index, for such articles account for a smaller share in total commodity output than in comparable output alone. Also, in machine building the low unit cost of mass-produced articles is to some degree balanced by the high unit cost of new articles not yet in normal production. The index of change in outlays per ruble of commodity output is related with the other indexes pertaining to the operation of a plant. It also is claimed that this index permits of more accurate planning and accounting for periods of 5 years and longer.

Although the index of change in outlays per ruble of commodity output is free from some of the defects of the index of change in cost, such serious objections have been lodged by Soviet economists since its adoption that it is surprising to find this index being used as the only official index pertaining to cost. A thorough analysis of this index, especially in view of its recent introduction and the lack of published statistical data, is beyond the scope of this report. Some of the major criticisms registered against the index in recent Soviet publications, however, merit a brief consideration.

As the main point of attack, it is alleged that the index of change in outlays per ruble of commodity output is not basically an index of the dynamics of cost at all but an index of change in profitability, reflecting, as it does, changes in annual ratios of the cost of production (outlays) to the value of commodity output, expressed in wholesale enterprise prices. Thus the index may reflect not only changes that occur in the cost of production but also changes that may be made in the wholesale enterprise prices at which output is sold. Additionally, the index may be affected by changes in the product mix as between products with different profit margins. The number of variable factors capable of affecting the ratios and distorting the index has caused anguished cries from the economists whose job it is to analyze and interpret the data. These distortions would perhaps be merely of academic interest if they did not lie at the center of the Soviet problem of finding a reliable criterion for evaluating and rewarding the performance of state enterprises in fulfilling the interrelated economic and technical indexes that are used to stimulate and direct their activities.

One Soviet economist, writing in Finansy SSSR (Finances of the USSR) for October 1959, concludes that the index of outlays per ruble of commodity output does not sufficiently stimulate the reduction of cost, for the performance of an enterprise is evaluated on the basis of an index that the enterprise itself can manipulate. In citing an instance of such manipulation, he remarks, "It is clear that it is only a game of figures. Can we permit a game of figures to be the basis for evaluating the struggle to reduce cost?" Objecting to the absence in the state plan of any index concerned purely with cost as such, he advocates adoption of a modified form of the index of change in cost.

The many methodological problems inherent in Soviet indexes on the dynamics of cost raise serious doubts as to the validity and usefulness of such data, and yet the matter of systematically reducing unit costs by fixed percentages and ruble values is treated with the utmost seriousness in the state plans. Under the Seven Year Plan, for example, the outlays of production in industry, construction, transportation, and the sovkhozes are to be reduced by approximately 850 billion rubles, a sum equal to almost one-half of the state capital investments planned for the 7-year period.

### 3. Institutional and Technological Factors

In addition to distortions arising from methodological problems inherent in Soviet indexes on the dynamics of cost, there are several institutional and technological factors that currently bear on the problem. The Soviet regime is bringing pressure to bear on machine building to intensify the degree of plant specialization with respect to basic manufacturing processes and product mix at the same time that it is attempting to foster the production of technologically more advanced and diversified output.

In the past the overwhelming drive of the Soviet leaders for quantity output at almost any cost led to the practice of dispersing production of some articles among high-cost producing plants. The practice of allowing some plants to manufacture an article at higher costs than others set the stage for substantial reductions in cost at the plants that were initially high-cost producers. Such reductions have been achieved by an unceasing campaign directed at high-cost producers to make them emulate the methods of the low-cost producers. Because of the absence of industry "trade secrets" within the economy, the USSR has been in a position to introduce, at any producing plant whatsoever, innovations and rational schemes developed at other plants. Although it is not possible to assess quantitatively the degree to which this factor has contributed to the annual reductions in the cost of comparable output in Soviet machine building, it is reasonable to assume that reductions from this source will be harder

to come by as the current program of "specialization and cooperation" tends to eliminate duplication of production programs among machine building plants.

Combined with the drive to increase plant specialization in machine building is a perceptible change in Soviet requirements, as expressed by the regime, in the mix and design of machinery and equipment for the economy. In spite of reductions in cost realizable from greater specialization in production of semifinished articles as well as standardized parts, components, and finished articles manufactured on a mass or large-series scale, Soviet requirements for technologically more advanced articles may lead to an increase in the over-all level of cost. The extent to which new articles (noncomparable output) may increase their share in the total commodity output of machine building or influence the ratio of outlays to the value of commodity output will, of course, depend on a number of factors. One factor is the relative emphasis placed by the regime on the domestic manufacture of new articles at any cost. Another is the extent to which the required types of machinery and equipment can be standardized and produced on either a mass or large-series scale. Still another factor is whether or not -- if the cost of a major effort to introduce the most advanced types of machinery and equipment into the economy is very high -- the present method of financing the cost of developmental work and tooling will be continued or whether a new method may be adopted.

In spite of the increasing importance of cost considerations in the organization of the production programs of Soviet machine building, it may reasonably be assumed that the desire of the Soviet leadership to achieve equality with, and eventually to overtake, the major industrial powers of the West in respect to the level of technology throughout the economy will justify the priority of physical production targets over considerations of cost in the case of particular types of machinery and equipment deemed essential to meeting immediate policy objectives. The recently initiated program for radically increasing the production of petrochemical equipment by dispersing production among various types of machine building plants as well as by expanding the petrochemical equipment industry itself, for example, emphasizes that under the Soviet system of selective forced-draft development of critical industries, physical production targets of machinery and equipment are of paramount importance when imports cannot be relied on to fill the gap in domestic requirements.

As the pressures to keep abreast of Western technology in industry have increased, the Soviet machine building industries have had to produce not only new standard equipment but also custom

equipment. Such production is burdensome to the Soviet method of planning and controlling the cost of production, and it is declared Soviet policy to standardize articles for large-scale production wherever possible. Because of the almost unlimited requirement in basic types of machinery and equipment that has characterized the Soviet economy since the inauguration of the 5-year plans in 1928, it has generally been economically feasible to standardize articles to a high degree and to manufacture them on a series or mass production basis with comparatively low unit costs of production. At the present time, however, as the technology of production grows more sophisticated, greater emphasis is being placed on complex automated types of equipment, especially in the chemical and ferrous metallurgical industries. Not all components of such equipment readily lend themselves to standardization, and it may be assumed that the unit costs of manufacturing them are consequently high.

Soviet economists have alleged that the present system of costing tends to retard the introduction of new articles both because of the high initial cost to the consumer and because of the lack of any marked profitability to the producer. Although it is professed Soviet policy to encourage the introduction of technically advanced equipment, the present method of charging off the cost of developmental work and tooling at the plant to the initial production cost allegedly tends to discourage immediate widespread introduction of such equipment because of its high price. Nor does the high initial cost generally associated with new articles in Soviet machine building necessarily make them more profitable than established articles for the producing plant to manufacture.

Although, in practice, producing plants may unofficially "pad" the estimated cost of new articles in order to assure themselves a margin of profit, the enterprise wholesale price of new articles in machine building is ordinarily set at a level that is 3 to 5 percent above the estimated cost. This margin of profit is similar to that set on established articles in machine building whenever prices are adjusted to costs. The fact that prices of established articles may be reviewed and adjusted to costs only at rather prolonged intervals in the USSR, however, means that, as prices remain constant and costs steadily decline, the margin of profit on established articles increases. Thus although a producing plant may meet its production target with respect to the planned volume of output of new articles, output in excess of the plan is apt to consist of those articles which are most profitable -- namely, established articles the prices of which have not currently been adjusted. The expenditure of precious resources on established articles that may be technologically inferior to new articles is not a desirable situation from the Soviet point of view.



Although it is obvious that some reform could be introduced to change the situation, any change of the existing procedure of costing new articles would presumably involve a degree of direct subsidization from the budget, a practice which runs counter to the principles of khozraschet and a practice from which the Soviet leadership attempted to escape at the time of the 1949 wholesale price reform. Furthermore, the high initial costs (and prices) of new articles tend to inflate the index of gross output and contribute to a substantially higher growth rate in machine building than would otherwise be the case, a feature that is of important propaganda value. Indexes of reduction in cost also are enhanced by the existing Soviet cost system, once the unit cost of new articles commences to decline.

A factor that weighs against these paper considerations is the official concern with the present rate of introducing equipment of improved design and efficiency. Methods of stimulating a more rapid rate of expansion and replacement of existing inventories of machinery and equipment with better machinery and equipment, however, presumably must not be incompatible with the centralized method of controlling the financial activities of state enterprises. Should the Soviet authorities feel that the present method of costing and pricing new articles is a stumbling block to their broader policy objectives, it is entirely possible that a change might be made if it did not run contrary to the principles of khozraschet.

#### IV. Structure of Cost

##### A. Comparison of Machine Building with Other Industries\*

Soviet economists, in analyzing the structure of cost in an industry, attach considerable importance to the relationship between the outlays for materials (including fuel, energy, and amortization of fixed capital) and the outlays for wages (including deductions for social insurance). Information on this relationship is needed in a planned economy for the regulating of wage rates, on the one hand, and of prices of materials and amortization charges,\*\* on the other. In general, a decline in outlays for wages relative to outlays for materials in the structure of cost is considered in the USSR to be an economically desirable development and an indication of technological progress.

The high degree of standardization in the accounting and reporting documents of nearly all Soviet industries facilitates comparisons of the structure of cost not only between individual plants within an industry but also between industries. In such comparisons the structure of cost is analyzed on the basis of the homogeneous primary economic elements found in the estimate of outlays for production. In Table 4\*\*\* the structure of the cost of output in Soviet machine building is compared with the structure of the cost of output in other selected heavy industries and in Soviet industry as a whole in 1959, the individual industries being arranged from left to right in the descending order of their labor intensiveness in terms of cost.

The most labor-intensive industries in the USSR are the extractive and machine building industries, where higher wages are paid and/or relatively larger amounts of manual labor are required than in industry as a whole. In the materials-intensive industries, such as the chemical and energies industries, the share of wages and deductions from wages in the total cost of output is below the average for industry as a whole.

##### B. Changes in Machine Building, 1932-59<sup>†</sup>

As shown in the tabulation below the balance between materials and wages in the cost of output in Soviet machine building changed markedly in the 27 years between 1932 and 1959.

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\* 18/

\*\* Until 1955, Soviet amortization charges on machinery and equipment were based on physical depreciation and capital repair only. Since that time, there has been an attempt to allow for technological obsolescence as well.

\*\*\* Table 4 follows on p. 54.

† 19/

Table 4  
USSR: Structure of the Cost of Output in Industry as a Whole  
and in Selected Heavy Industries  
1959

Outlays Categorized by Primary Economic Elements	Industry as a Whole	Coal	Machine Building and Metalworking	Petroleum Extraction	Ferrous Metallurgy	Chemicals	Percent a/ Electric and Steam Energy
Basic materials	63.9	16.9	51.8	0	48.4	63.9	0
Auxiliary materials	4.8	13.5	4.5	8.4	6.0	5.6	4.7
Fuel	3.6	0.8	2.0	1.8	13.5	2.3	55.0
Energy	1.7	2.7	2.1	8.9	2.1	5.2	0.3
Wages and deductions for social insurance	19.3	53.6	31.7	22.5	21.1	16.0	14.5
Amortization	3.5	5.7	3.9	46.5	5.8	4.0	20.3
Other expenditures	3.2	6.8	4.0	11.9	3.1	3.0	5.2
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

a. Based on outlays of production in current rubles.

<u>Outlays</u>	<u>Percent</u>					
	<u>1932</u>	<u>1940</u>	<u>1953</u>	<u>1955</u>	<u>1957</u>	<u>1959</u>
Materials (including fuels and energy) and amortization	39.3	57.9	64.4	63.1	62.2	64.3
Wages (including deductions for social insurance)	51.1	36.5	31.3	33.2	34.1	31.7
Other expenditures	9.6	5.6	4.3	3.7	3.7	4.0
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

The relative decline in wages may be attributed mainly to the growth of mechanization and to new technologies of production. According to Soviet economists, the change in the structure of cost has been especially marked in machine building because of the introduction of mass and large-series production techniques. Soviet economists further claim that the increase in the share of materials and amortization and the decrease in the share of wages has been accompanied by a steady reduction in total outlays per unit of output. Whether or not declines in Soviet accounting costs per unit of output can be considered a reliable indication of declines in real costs, however, is far from certain. It is noteworthy that the share of wages and deductions from wages tended to increase between 1953 and 1957. This change probably was due to reductions in the wholesale prices of materials as well as to increases in wages which occurred during this period.

### C. Analysis\*

#### 1. Machine Building as a Whole

The structure of cost in Soviet machine building is typified by the following characteristics: (a) a sizable share of outlays for basic materials in comparison with most other branches of heavy industry, (b) the purchase by some machine building plants of large quantities of semifinished goods from other machine building plants, and (c) a large wage bill compared with the average for industry.

The relatively high share of outlays both for materials and wages in machine building is explained by several qualitative considerations. Not only are relatively expensive materials (high-quality ferrous and nonferrous metals) used in machine building, but these

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\* 20/

materials also are subjected to complex and repeated processing at the machine building plants. The degree to which raw materials are converted into semifinished goods within the plant that manufactures the finished article (that is, the degree of vertical integration) and the degree to which semifinished goods are purchased from other plants (a transaction known as "cooperation" in the USSR) varies greatly from plant to plant within the machine building industry.

In the technology of Soviet machine building, there is a predominance of mechanical processing that is more labor consuming, for example, than the chemical and electrical processes employed in some other branches of industry. Differences in the share of wages in the total outlays of individual machine building plants largely reflect the relative complexity of the technology in use at the plant and the amount of precision work requiring a high degree of manual skill.

The relatively small outlays for fuel and electrical energy in machine building as compared with some other branches of industry is explained mainly by the very limited use in machine building of chemical and electrical processes that require a large amount of fuel and energy. The size of the outlays for fuel and energy in machine building plants depends largely on the level of technology and the scale of production in foundries and forges.

The percentage of outlays for amortization in machine building is relatively small, considering the complexity and cost of equipment. Soviet economists explain this fact in large part, however, by citing the relatively high productivity of the equipment found in machine building plants.

## 2. Individual Machine Building Plants and Shops

The cost pattern varies between individual types of machine building plants, depending on a number of factors. Differences in the structure of cost within the machine building industry are illustrated in the tabulation below, where various costs in a heavy machine building plant are compared with those in a plant producing cutting tools:

	Percent	
	Heavy Machine Building Plant	Cutting Tools Plant
Materials (less scrap)	23.1	38.8
Purchases of semifinished goods	22.4	0
Auxiliary and other materials	4.0	7.7
Fuel	8.9	1.6
Energy	0.6	1.6
Base and supplemental wages	30.7	37.9
Deductions for social insurance	2.1	2.9
Amortization	4.5	4.4
Other expenditures	3.7	5.1
Total	<u>100.0</u>	<u>100.0</u>

The total structure of the cost of output also varies greatly among the individual shops of a machine building plant. Cost categorized by items of calculation instead of by primary elements is usually used in comparing the structure of cost in the various shops within a machine building plant, especially if intraplant khozraschet is established at the plant. The tabulation below shows the structure of the actual cost of output in selected shops of the Urals Heavy Machine Building Plant in a recent year.

Outlays	Percent				
	Assembly Shop	Foundry	Forge	Repair Shop	Tool Shop
Materials	77.6	24.6	68.2	20.4	35.4
Fuel used directly in the production process	0	0.6	3.3	0	0
Electrical energy used directly in the production process	0	7.8	0	0	0
Wages paid to production workers	4.8	15.3	3.3	30.1	28.2
Deductions for the social insurance of production workers	0.4	1.3	0.3	2.8	2.3
Shop expenditures	14.0	43.0	20.3	46.3	34.1
Depreciation of cutting tools and dies	2.6	1.1	4.5	0.4	0
Losses from rejects	0.6	6.3	0.4	0	0
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Differences in the structure of cost at the various shops are explained primarily by differences in the technology and organization of production. Thus in the assembly shop the outlays for semifinished goods (parts and components) manufactured in other shops at the plant or at cooperating enterprises account for a large share in the cost of output. Outlays for materials other than semifinished goods are small in assembly shops.

The large share of outlays for energy used directly in production in the foundry is due to the use of electric furnaces for smelting metal. The sizable outlays for cutting tools and dies in the forge compared with the other shops result from the extensive use of stamping and, increasingly, costly dies.

## APPENDIX A

### KHOZRASCHET\*

The system of khozraschet was introduced in the USSR in 1921 at the inception of the New Economic Policy (NEP). Lenin is quoted as having written that "the transfer of state enterprises to so-called khozyaystvennyy raschet is inevitably and indissolubly connected with the new economic policy and in the near future this type of enterprise will inevitably become predominant, if not exclusive." The trend toward khozraschet was accelerated under the policy of industrializing the country. A decree of the Central Committee of the All-Union Communist Party, dated 5 December 1929, on reorganization of the administration of industry declared that khozraschet had fully justified itself and that it was to be introduced in all enterprises of state industry. During World War II, however, substantial concessions were made in this policy as the result of wartime economic pressures. Since the war a number of measures have been inaugurated to restrengthen the khozraschet system in state enterprises.

Khozraschet enterprises are distinguished from budgetary enterprises by the following features:

1. A charter establishing the departmental subordination of the enterprise, its structure, the competence of the administrative and technical chiefs, the rights and obligations of the enterprise as a juridical entity, and its relationship to controlling economic organizations.
2. A charter fund allocated by the government in the form of fixed and working capital needed by the enterprise for obtaining the physical resources required for continuous operation in fulfillment of state plans.
3. A plan of operation organized on the basis of an annual technical-industrial-financial plan (tekhpromfinplan) detailing the planned targets with respect to volume of production, labor, cost of output, materials and technical equipment to be supplied, the sale of output, financing, and capital accumulations.

\* 21/. See the second footnote on p. 10, above.



4. Operational independence in the disposition of funds within the limits of the existing state plan. This independence is exercised by the directors of the enterprise in devising and applying the most effective methods of organizing production, of providing the enterprise with the necessary labor force, of procuring materials at the proper prices, and of selling the output of the enterprise at established state prices.
5. The utilization of credit in appropriate banking institutions when the working capital allotted to the enterprise proves to be insufficient.
6. The use of a payment account (raschetnyy schet) in the State Bank (Gosbank) for accumulating reserve funds.
7. A complete system of recording (uchet) and reporting (otchet) in order to show the results of economic activities connected with production.
8. A periodic balancing of the books to establish the financial status of the enterprise.
9. Provision of material incentives for the personnel of enterprises by utilizing a part of the enterprise's capital accumulations for awarding premiums and for improving living conditions.
10. Responsibility for a rational program of operation, including proper and efficient utilization of labor, materials, and finances.

Khozraschet enterprises are charged with definite responsibilities in the following activities at the enterprise level: the planning of production, the planning and supervision of capital construction, the exercise of technical control, the organization of the supply and sales system, the conduct of commercial and financial transactions, the settlement of labor problems, the training and assignment of the labor force, and the appointment and dismissal of supervisory personnel.

Of all the features that set a khozraschet enterprise apart from a budgetary enterprise, perhaps the most significant is the responsibility that the khozraschet enterprise bears to the state in return

for the use of state-owned capital. The fixed capital that the state allocates to each khozraschet enterprise is used to erect and equip the physical plant, and the working capital is used to purchase stocks of materials in given quantities and prices and to maintain funds in the bank for paying the wage bill and settling the accounts of the enterprise with other enterprises and organizations. A khozraschet enterprise may increase its fixed capital through capital accumulation -- that is, by investing a portion of its profits in expanding or modernizing the plant. In the event that the working capital allocated to a khozraschet enterprise by the state in the charter fund is insufficient, the enterprise can obtain bank credit that is repayable at a date and with a fixed percentage fee dependent on the size of the loan and the length of the period for which it is granted.

The state, as the owner of the capital allocated to khozraschet enterprises, has the right to redistribute working capital by withdrawing surplus working capital from one enterprise and transferring it to another enterprise that is short of working capital. Under the former ministerial system of managing the economy, the state granted ministries the right to build up reserves in the amount of 3 percent of a ministry's total working capital in order to render temporary financial aid to its enterprises. A ministry could use the reserve working capital of one of its enterprises for another of its enterprises on the condition that the capital be returned within a period of 3 months, with payment of a fee corresponding to the percentage rate prevailing in Gosbank. Under the present system, when production is being expanded and an enterprise cannot meet the required increase in working capital from its own capital accumulations, supplemental working capital may be allocated from the state budget.

Another marked feature of most khozraschet enterprises is that they are expected to operate at a planned profit. The profit of an enterprise represents the margin between the full ruble cost and the wholesale price of the output of the enterprise. It is this opportunity to make not only the planned profit but a profit even greater than planned that the Soviet state regards as the principal incentive in its drive for continuously improving efficiency and productivity in state industry. The more that the actual cost of production can be trimmed in comparison with the planned cost, the greater is the profit of the enterprise.\*

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\* Sometimes the methods of making greater-than-planned profits have been of dubious benefit to the economy as a whole, and other methods that have been clearly at the expense of the planned product mix have been roundly condemned by the state.

The profit realized by a khozraschet enterprise is usually disbursed among the following items:

1. Payments to the state budget
2. Payments to the Industrial Bank (Prombank) for use in capital construction
3. Replenishment of the enterprise's working capital
4. Financing of special measures, such as the training of personnel, the introduction of new technical equipment, the repayment of losses incurred in operating the enterprise's housing, and municipal services
5. Capital construction (over and above planned capital investments)
6. Cultural services and bonuses to workers and improvement of housing

Some of the features of khozraschet that are applicable at the general plant level do not apply at the shop level or in the relationships between shops within a plant which operate under so-called intraplant khozraschet. For example, the contract basis of delivery from one khozraschet enterprise to another, the independent accounting balance sheet, the payment account in Gosbank, and the granting of bank credits, all of which are characteristic features of khozraschet at the plant level, do not apply to shops and other organizational units of a plant operating under intraplant khozraschet.

The principal financial control over khozraschet enterprises is exercised by the Ministry of State Control and the Control and the Control-Revision Administration of the Ministry of Finance, USSR.

## APPENDIX B

### NORMS\*

#### 1. General

Basic to the Soviet system of planning and controlling the volume, cost, and price of industrial output is the widespread and, in machine building, mandatory use of norms to calculate the inputs of production and to derive indexes of productional efficiency. Soviet economists describe these norms as "computed values used for planning the production program and the technical and economic efficiency of an enterprise as well as for evaluating its performance."

Although each norm is a specific value, all norms are subject to periodic review and adjustment as changes occur in the technology and organization of production. In establishing norms, Soviet officials insist that they be "progressive" -- a Soviet euphemism meaning that norms must be continually tightened up.

Soviet planners declare that the setting of norms of production is indispensable to running a planned economy. Norms are considered essential in establishing the national economic balance sheet in which available supplies of materials are correlated with the consumption requirements of production. In machine building, where so much of the output is produced on a mass or large-series scale in widely divergent economic areas, norms are an important element in bringing productional efficiency in the manufacture of similar products into a more uniform relationship over the country.

#### 2. Types of Norms

##### a. Consumption Norms

Because it is used to determine more than 90 percent of the cost of output in Soviet machine building, the consumption norm (raskhodnaya norma or norma raskhoda) merits primary consideration. In keeping with Soviet accounting categories, the two principal types of consumption norm used to compute the outlays of production are the labor consumption norm (norma zatrat truda) and the material consumption norm (norma raskhoda material'nykh resursov).

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\* 22/

### (1) Labor Consumption Norms

Labor consumption norms stipulate the amount of time required for a worker to perform a unit of work (an operation) or the amount of output that a worker can produce in a given time. The first is called a time norm (norma vremeni) and the second an output norm (norma vyrabotki). The output norm is actually a derivative of the time norm.

#### (a) Time Norms

Time norms are usually used to measure labor inputs at machine building plants where the output is produced in small series or in single units. These norms are established by determining the amount of working time (hours and minutes) required by a skilled worker to complete a particular job or operation under the prevailing technology and organization of production.

When wages are paid on a piece-rate basis, as is common in machine building, the time norm is used to establish wages in relation to the orders being filled. Thus the time norm stipulates the amount of working time (basic and subsidiary) to be allocated directly to the productional operation, the amount to be spent in servicing the work area, and the amount of preparatory and down time allowed in the manufacture of an entire batch of articles.

#### (b) Output Norms

The output norm specifies the number of units of output, expressed in tons, kilograms, meters, pieces, or the like, that a worker must produce in a given length of time. Output norms are used primarily where mass and large-series production prevail. Such norms may be established equally well for the plant as a whole or for groups of workers. The best productional results achieved by one plant or by one group of workers in a plant are used to spur the more backward plants and workers throughout the USSR to improve their labor productivity. Output norms are used extensively in intraplant planning and accounting.

#### (c) Principles for Setting Labor Norms

In many cases, one and the same operation can be performed in machine building using different methods and different equipment. Consequently, different amounts of time may be required to complete an operation, depending on the method and equipment used. To achieve the highest productivity of labor in the performance of a specific operation, Soviet officials call for adoption of the method

that embodies the most effective utilization of equipment, the most productive technology, and the best organization of labor.

Soviet economists distinguish between two methods of setting labor norms. One method is referred to as the analytical method (analiticheskiy metod) and the other as the empirical-statistical method (opytno-statisticheskiy metod). The second method is in disfavor.

The analytical method of establishing labor norms is based on "a strict verification of potential increases in the productivity of labor and of the optimum utilization of equipment and organization of labor." The analytical approach to setting labor norms is considered the only truly scientific approach. All labor consumption norms determined by the analytical method are referred to as technically based norms (tekhnicheski-obosnovannyye normy). The analytical method requires a breakdown of each operation into elements, a computation of the duration of each element of the operation, and finally a computation of the norm as a whole. Calculations are based on indexes that describe the absolute production capabilities of the equipment used (capacity, load limit, and the like), the material factors which influence the productivity of labor (the quality of the materials processed and the cutting tools used), and the optimum utilization of working time, not only with respect to equipment, tools, and materials but also with respect to the skills of the worker. This approach to setting labor norms requires independent research in order to determine which method insures the maximum utilization of the factors of production. The approach also involves the chronometering of working time and dissemination of the best results and most advanced methods. Technically based norms are considered "progressive" norms, as they allow for continuous increases in labor productivity independent of actual performance at any time.

In practice, however, some industrial enterprises apparently still use the so-called empirical-statistical norms in place of or along with technically based norms. Such norms are established on the basis of reported statistical data in the previous period or merely on the basis of the observations of norm setters. Both the Communist Party and the Soviet government have condemned the use of empirical-statistical norms, for they do not insure the maximum growth of labor productivity. There is an active campaign to eliminate entirely empirical-statistical norms from Soviet machine building.

#### (d) Uses of Labor Consumption Norms

In the USSR, labor consumption norms are used not only to determine the share of the wages of individual production workers

(or groups of production workers) in the total wage bill of a plant or industry but also to measure changes in labor productivity. In planning the production programs, labor consumption norms provide the data necessary for computing the production potential of individual sections, shops, and plants as a whole; for determining the amount of equipment, the number of workers, and the wage fund required to meet a production target; and for scheduling completion dates in the manufacture of components, parts, and finished articles.

Labor consumption norms also are used to determine the labor intensiveness (trudoyemkost') of production and to plan the cost of labor per unit of output. The share of the cost of labor in the total cost per unit of output is calculated from the sum of the individual time norms for all operations required to manufacture a unit of output under the given conditions of production. Because labor consumption norms are used to plan the production programs of plants, the quality of planning depends in large part on the validity of the norms. Soviet planners declare that the correct formulation of labor consumption norms is prerequisite to the correct planning of wages.

## (2) Material Consumption Norms

Material consumption norms stipulate the amounts of various materials considered necessary for production of a unit of output or the completion of a unit of work under specified conditions of production. Soviet officials take the position that a planned economy is impossible without technical norms which can be used to plan the material inputs of production.

Although, in the broadest sense, machinery and equipment are classified as materials in the USSR, the setting of norms for the depreciation of machinery and equipment follows a pattern different from that followed in setting norms for the consumption of raw materials, processed materials, fuel, and electric energy. The difference arises from the fact that materials, fuel, and electric energy are classified as working capital, whereas machinery and equipment are classified as fixed capital. In setting norms for raw materials, processed materials, fuel, and electric energy, consumption is computed per unit of output, whereas in setting norms for machinery and equipment, it is the degree of utilization and the length of service that are computed. For the sake of convenience, norms pertaining to raw materials, processed materials, fuel, and electric energy are treated under material consumption norms in this appendix, whereas norms pertaining to machinery and equipment are treated under the separate subheading of amortization norms.\*

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\* For a discussion of amortization norms, see b, p. 70, below.

(a) Classification of Material Consumption Norms

There are several criteria for classifying material consumption norms in the USSR. On a substantive basis, all material consumption norms are classified as specific or general. Specific norms are formulated to cover the materials consumed in the performance of a specific operation or for the manufacture of specific articles. General norms are designed to cover the materials consumed in diverse types of operations where the only common unit is rubles or hours.

A similar distinction is made with respect to the applicability of material consumption norms. Here, norms are characterized as individual or group norms. Individual norms are those which are limited in application to the manufacture of a single article or to production performed on a single piece of equipment. Group norms apply to articles of a similar type or nomenclature manufactured on more than a single given machine. Group norms are really aggregative norms that reflect the average consumption of materials per unit of output for specific administrative or geographic jurisdictions in the USSR.

With respect to their effective duration, material consumption norms are classified as annual norms and current norms. As a rule, material consumption norms are effective for a year. In addition to annual norms, however, current norms may be established for specific periods within the year when there are regular seasonal fluctuations in the percentage of materials consumed per unit of output or when changes in the consumption pattern arise from organizational and technical measures taken to realize economies of production. Current norms may be higher or lower than the annual norms. The weighted average of all the current norms in the course of a year, however, must be equal to or better than the approved annual norm.

Still another distinction in material consumption norms is made between technical norms and technical-economic norms. Technical norms merely indicate the amount of materials required to produce a unit of one or another type of output. In making the calculations for these norms, use is made of technical data contained in the designing documents and of results obtained from test production runs. Technical norms are calculated with the use of specific equipment and on the assumption of optimum output under the given conditions of production. Because actual conditions of production do, in fact, vary, technical norms also may vary. Technical norms are formulated without considering the factor of cost.



Technical-economic norms are based on technical norms but, in addition, take into account all the economic factors of production. These norms are designed to improve the utilization of materials in production and to reduce the cost of output. In formulating technical-economic norms, the norm setters take into consideration recommendations that have been made by innovators and rationalizers to streamline production and conserve materials as well as the latest achievements of science and engineering.

#### (b) Formulation of Technical-Economic Norms

In principle, technical-economic norms are identical in structure for practically all types of materials. The formula used in setting consumption norms for materials is  $N_p = T + D + P$ , where T is the net amount of materials required per unit of finished output, D represents additional consumption per unit of output arising from losses attributable to the technology of production, and P represents additional consumption of materials per unit of output other than those directly attributable to the technology of production -- mainly losses occurring in the delivery and handling of materials.

The value T in production of one or another type of output either is calculated by formulas or is determined by a direct measurement or weighing of the finished article. In setting norms for the consumption of metal or wood in production of articles that are made exclusively of metal or wood, for example, the value T is identical with the net weight of the metal article or the net volume of the wooden article. The difference between the actual consumption of materials per unit of output and the value T is used as an indicator of the efficiency of the technological process in use. For any given technological process of production or given design of an article, the value T is a fixed amount. Whenever the technology of production or the design is changed, the value T also is changed. The "progressiveness" of a newly formulated technical-economic norm is gauged by comparing not only the value T in the respective norms but also the values D and P.

It is recognized, of course, that losses of material inputs (D) arising from the technology of production are inevitable in any given production process. The official Soviet position, however, is that the size of the losses is not fixed and can always be further reduced.

As for losses connected with the handling of materials and finished output (P), the official position is that such losses are not inevitable and can be partly or entirely eliminated.

Technical-economic norms may be reduced by either of two methods: by reducing losses of materials in production (D and P) or by decreasing the net consumption of materials per unit of output (T). As an example of the latter method, the consumption norm for metal in machines can be reduced by introducing rational changes in the design of parts and components.

(c) Principles for Setting Material Consumption Norms

One of the major considerations in setting material consumption norms is the dovetailing of norms with state plans for conserving materials. Reduction of unit consumption of materials in Soviet industry is effected in the main by the tightening up of norms. The Soviet regime has devised a number of methods, in the absence of market competition, to spur reductions in material consumption per unit of output. These methods include socialist competition, rationalization and innovation, and recognition of better-than-norm performance, all of which are accompanied by honorific and/or monetary rewards. These various methods of reducing consumption are incorporated in subsequent norms that thus serve as the principal vehicle for continuous reduction in the outlays of materials per unit of output.

In planning the future output of articles that also have been produced in the past (so-called comparable output), Soviet officials stipulate the total amount by which the unit consumption of materials is to be reduced. For example, the state supply plans for 1949-52 called for a reduction of about 3 million metric tons of ferrous metals, 40 million metric tons of standard fuel, 8 billion kilowatt-hours of electric energy, and 14 million cubic meters of lumber. Such goals are implemented by successive reductions in the material consumption norms each year and are formulated on the basis of a plan of organizational and technical measures (orgtekhplan) drawn up by each plant in an effort to improve the utilization of resources. Soviet officials claim that the setting of norms for the consumption of materials facilitates better organization of production, reduction of the cost of comparable output, administration of khoz-raschet, and reduction of excess stocks of materials while generally increasing the profitability of enterprises. In 1954, with a reduction of 4.4 percent planned in the cost of industrial output, 1.2 percent was to be achieved by reducing outlays of raw materials, processed materials, fuel, and electric energy per unit of output.

(d) Procedure for Establishing Material Consumption Norms\*

Drafts of new consumption norms, incorporating prospective reductions compared with prevailing norms, were worked out by plants and submitted for approval to the appropriate main administration and ministry. The ministry submitted drafts of the most important material consumption norms, particularly those involving critical or deficit materials, to Gosplan, USSR, for approval. Individual norms that were deemed especially important required the approval of the Council of Ministers, USSR.

The Council of Ministers annually established for the individual ministries and departments the quotas for the average reduction of material consumption norms, presumably based on the requirements of over-all economic planning. The ministries and departments, in conformity with these quotas, approved or adjusted the consumption norms submitted to them by their producing plants. These official norms were then disseminated to the production level. Individual norms that had been coordinated with Gosplan, USSR, were formally confirmed by the ministries. A ministry could subdivide group norms that had been coordinated with Gosplan, USSR, into differentiated norms applicable to its various main administrations and producing plants. These differentiated norms could deviate from the group norm but, when averaged together, had to conform to the group norm.

b. Amortization Norms

The amortization norm is used to establish the amount by which the initial value of machinery and equipment is to be written off annually. In the majority of cases the annual amortization norm in

percent is determined by the use of the formula  $\frac{(S_f + R - L)100}{DS_f}$  where

$S_f$  is the full initial value of the fixed capital,

$R$  is the value of capital repair and expenditures connected with liquidation,

$L$  is the residual value of the machine or piece of equipment being amortized, and

$D$  is the length of service.

\* This description is based on the procedure followed under the ministerial form of organization. It is [footnote continued on p. 71]

Since 1938 the Soviet government has confirmed for the separate branches of the national economy (and for industry in particular) average norms of amortization deductions, expressed as percentages of the initial value of existing machinery and equipment. In view of the heterogeneous composition of fixed capital in industry as well as differences in the degree of utilization and consequently differences in the depreciation period, differentiated amortization norms exist within the individual industries and plants. The differentiated amortization norms established for producing plants fall within the limits of the deductions and appropriations approved for their industry as a whole. The plant, in turn, may use differentiated norms for each type of machinery and equipment within the limits of the amortization norms approved for the plant. Plants calculate amortization monthly (at the beginning of the month) by computing the percentage of the annual amortization norm or the percentage of work completed.

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believed that the same procedural principles are followed today, with the difference that the regional economic councils and the councils of ministers of the various republics have replaced the main administrations and ministries, respectively. It is believed that the regional offices of the CSA and Gosplan now play a more decisive role than heretofore by exercising a closer check on data and analysis.

## APPENDIX C

### THE NORMATIVE METHOD OF CALCULATING THE UNIT COST OF OUTPUT\*

#### 1. Determination of Deviations from Material Consumption Norms

Plants that use normative accounting usually determine deviations from current norms for the materials consumed in the manufacture of given groups or types of similar articles by the method that follows. The bookkeeping office of Plant X, for example, draws up a monthly Record of the Movement of Materials in Production of a given type of machine.\*\* This report establishes the balances of materials on hand at the beginning of the month, the flow of materials to the shops of the plant during the month, and (on the basis of an inventory) the balances on hand at the end of the month. With the use of these data, the actual consumption of materials is computed for the month -- Columns (9) and (10) in Table 5 -- the result is compared with the consumption norm for the month -- Columns (11) and (12) -- and deviations from the current norms are computed -- Columns (13) and (14). The deviations from material consumption norms shown in Columns (13) and (14) are then transferred to a worksheet on which the consumption norm and the deviations from the consumption norm are recorded for each of the items of calculation appropriate to production of the given type of machine.\*\*\*

#### 2. Monthly Worksheet for Computing Basic Production

Where the normative method of accounting is used in machine building, an index of deviations from current norms is computed as a prerequisite to calculating the actual unit cost of individual articles. Such an index is computed separately on monthly work sheets<sup>†</sup> for each group of similar articles before monthly cost calculation reports are submitted. In Columns (10) and (22) of the worksheet shown in Table 6, the ruble values of deviations from current norms for Type S machines are entered opposite the respective items of calculation. Column (20) shows the ruble value of outlays for the month that can be charged to commodity output. The ruble values of the deviations from the norms -- Column (22) -- are then divided by the value of the outlays charged<sup>††</sup>

\* 23/

\*\* For a sample of such a monthly record, see Table 5, which follows on p. 75.

\*\*\* See Columns (7) and (8), (9) and (10), and (21) and (22) of the sample worksheet in Table 6, which follows on p. 77.

† For a sample worksheet, see Table 6, which follows on p. 77.

†† Text continued on p. 79.

Table 5  
JSSH: Sample Record of the Movement of Materials in Production of Type S Machines at Machine Building Plant X, n/  
July 1957

Shop	Balance at Beginning of Month		Flow of Materials to Shop		Total	Balance at End of Month		Total Consumed		Consumption Norm		Deviation from Consump
	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)		Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	
Foundry A	36	570	1,883	30,525	1,919	14	223	1,905	30,872	2,081	34,216	-176
Forge B	5	80	2,758	43,963	2,763	3	48	2,760	43,995	2,618	41,734	+142
Assembly shop C	31	660	2,179	52,639	2,510	30	640	2,480	52,659	2,500	53,086	-20
Total materials		1,310		127,127			911		127,526		129,036	-1

a. Based on hypothetical data. Blank spaces indicate that there are no applicable data or that data are not pertinent to the computation.

[p. 74 blank]

Table 6

USSR: Sample Worksheet for Computing Basic Production of Type S Machines at Machine Building Plant 1  
July 1977 3/

(1)	(2)	(3) Unfinished Production at the Beginning of the Month		(4) Unfinished Production at the End of the Month		(5) Change in Stock		(6) Outlays for the Reported Month (July 1977)		(7) Outlays for the Reported Month (July 1977)		(8) Total Outlays Plus Balance According to Current Norms		(9) Total Outlays Plus Balance According to Current Norms		(10) Final Projects According to Current Norms		(11) Test Materials According to Current Norms		(12) Unfinished Production at the End of the Month According to Current Norms		(13) Quantity of Outlays According to Current Norms		(14) Quantity of Outlays According to Current Norms		(15) Quantity of Outlays According to Current Norms		(16) Quantity of Outlays According to Current Norms		(17) Quantity of Outlays According to Current Norms		(18) Quantity of Outlays According to Current Norms		(19) Quantity of Outlays According to Current Norms		(20) Quantity of Outlays According to Current Norms																																																																																																																																																																																																																																																																																																																																									
		Unit of Measure	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand 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Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)	Quantity (Metric Tons)	Value (Thousand Rubles)

\* Based on hypothetical data. Blank spaces indicate that there are no applicable data or that data are not pertinent to the computation.

† Including changes in current norms.

‡ Percentage deviation from current norms. Negative quantities indicate that actual outlays were less than current norms, whereas positive quantities indicate that actual outlays were in excess of current norms.

§ Column (3) plus Column (4).

|| Column (5) plus Column (6).

¶ Column (7) plus Column (8).

‡ Column (9) plus Column (10).

§ Column (11) plus Column (12).

|| Column (13) plus Column (14).

¶ Column (15) plus Column (16).

‡ Column (17) plus Column (18).

§ Column (19) plus Column (20).





to commodity output -- Column (20) -- to derive an index of deviations -- Column (24) -- for calculating the unit cost of various Type S machines (for example, an S-2).\* Because the outlay norms established for the individual machines within a group or type may vary somewhat and because the incidence of rejects among them is not uniform, the index of deviation (-5.59) calculated for the full unit cost of Type S machines as a whole in Column (24) of the worksheet is not used as a coefficient for calculating the actual unit cost of the individual machines within the group. Before examining how the actual unit cost of a specific machine is calculated, however, the explanation that follows may help to clarify the worksheet.

The data in Column (7) through (10) opposite the stub heading "Materials" have been entered from Columns (11) through (14) of the Record of the Movement of Materials in Table 5.\*\*

The data on wages in Columns (8) and (10) have been taken from documents on production and from the supplemental payroll. Deductions for social insurance are calculated as a percentage of wages.

The entries for shop and general plant expenditures in Columns (8) and (10) reflect the relationship of actual outlays to the approved estimate of outlays. Actual shop outlays in July 1957 would have been 75,910,000 rubles -- Column (8) minus Column (10) -- according to the data in Table 6. Rejects and any shortages in unfinished production are written off at norm cost.

Unfinished production at the end of the month -- Column (18) -- given as 16,038,000 rubles, was obtained from separate calculations based on inventories and/or primary documents. The value of outlays charged to the commodity output of the plant in production of Type S machines -- Column (20) -- is derived by subtracting the value of final rejects -- Column (14) -- test materials -- Column (16) -- and unfinished production at the end of the month -- Column (18) -- all valued according to current norms, from the total outlays expended during the month plus the balance of unfinished production at the beginning of the month -- Column (12).

In this particular worksheet, only deviations from norms are shown. Deviations between the actual and planned prices of materials are entered in a separate calculation sheet. The separation of deviations from norms and deviations from prices is of considerable importance in analyzing the cost of output.

\* For a sample report showing the unit cost calculation of an S-2 machine, see Table 7, which follows on p. 80.

\*\* P. 75, above.

Table 7

USSR: Sample Cost Calculation Report for the S-2 Machine (Type S) a/  
July 1957

Itemized Outlays	Outlays per Unit of Output b/							
	(1)		(2)		(3)		(4)	
	Quantity (Kilograms)	Value (Rubles)	Quantity (Kilograms)	Value (Rubles)	Quantity (Kilograms)	Value (Rubles)	Quantity (Kilograms)	Value (Rubles)
According to Plan c/								
According to Current Norms								
Deviations								
Actual								
Basic and auxiliary materials								
Foundry A	452.11	7,360.00	462.62	7,462.75	-39.42	-737.32	1423.20	6,725.43
Forge B	312.42	4,980.61	312.46	4,980.61	+17.15	+273.14	329.61	5,254.05
Assembly shop C	913.0	9,700.05	919.92	9,706.40	-6.99	-78.62	912.93	9,627.76
Total materials		22,040.66		22,149.76		-542.50		21,607.26
Reusable scrap		55.00		50.81				50.81
Total materials less reusable scrap		21,985.66		22,098.95		-542.50		21,556.45
Basic and supplementary wages		2,915.28		2,846.70		469.11		3,316.41
Deductions for social insurance		290.52		242.00		+39.14		281.44
Shop expenditures		14,156.00		14,527.10		-1,244.97		13,282.13
General plant expenditures		4,128.17		6,318.90		-2,253.95		4,064.95
Losses from rejects						+369.44		369.44
Plant cost		43,475.63		46,033.65		-3,162.83		42,870.82
Nonproductional expenditures		572.25		490.85		+33.40		524.33
Full cost		44,047.88		46,524.50		-3,129.35		43,395.15

a. Based on hypothetical data.

b. The cost calculation report also contains information on the planned unit output, the actual unit output, and the percent of planned fulfillment. The following data were reported in the illustrative example in this table:

Planned output	5,435 units
Actual output	5,906 units
Percent of fulfillment	106.7

c. Presumably the planned quarterly average.

d. Because of rounding, components may not add to the totals shown.

The entire column of deviations from monthly outlay norms -- Column (10) -- is carried over to Column (22) in computing the index of deviations for commodity output -- Column (24) -- so that deviations may be fully allocated to the cost of output in the reporting period.

### 3. Calculation of the Unit Cost of an Article

Reports on the unit cost of each major article\* produced at a plant are submitted monthly, using the index of deviations shown in Column (24) of the worksheet (Table 6)\*\* to calculate the cost. The cost calculation report is intended to provide a comparison of the actual unit cost of a specific article -- Column (8) in Table 7 -- with both the planned quarterly average cost -- Column (2) -- and the current (monthly) norm cost -- Column (4).

To calculate the actual unit cost of the S-2 machine in July 1957, the current norm costs in Column (4) of the cost calculation report were multiplied by the respective deviations computed for Type S machines as a group in Column (24) of the worksheet. The results were divided by 100, and the quotients were entered in Column (6) of the cost calculation report opposite the appropriate item of calculation. Column (6) shows the ruble value by which the actual costs of each S-2 machine deviated from the normed costs. Actual costs are then entered in Column (8) after the deviations have been added to or subtracted from the norm costs. According to the data in Table 7, the full norm cost of the S-2 machine in July 1957 was 46,524.50 rubles. The deviation from the norm cost was -3,129.35 rubles, representing a saving of 6.7 percent above the norm cost and resulting in an actual unit cost of 43,395.15 rubles. In the example of the S-2 machine, the actual unit cost was not only lower than the monthly norm cost but also was lower than the planned quarterly average cost of 44,047.88 rubles. Since July is the first month of a quarter, it is doubtful whether or not the actual unit cost in July would often be lower than the planned quarterly average cost.

\* For a sample report showing the unit cost of an S-2 machine in the month of July 1957, see Table 7, p. 80, above.

\*\* The worksheet (Table 6) is on p. 77, above.

## APPENDIX D

### COST DATA FROM THE 1941 STATE PLAN FOR THE DEVELOPMENT OF THE NATIONAL ECONOMY OF THE USSR\*

Although the State Plan for the Development of the National Economy of the USSR in 1941 is now primarily of historic interest, it is believed that the method of planning cost at the national level has not changed substantially since that time. A copy of the 1941 state plan is the only such document that is known to have reached the West. Accordingly, data pertaining to cost in the machine building industries have been extracted from this plan to provide a graphic example of the manner in which cost data are derived for national industries.

For purposes of comparison, Table 8\*\* shows summary data on the planned level of the cost of commodity output and the planned percentage reduction in the cost of comparable output established for individual industries, including the machine building industries, as well as for industry as a whole. It should be noted that, in the 1941 plan, the percentage by which the cost of comparable output was to be reduced in the principal machine building industries was uniformly high, ranging from 6.0 percent to 11.1 percent, compared with other industries. It also should be noted that, with a range of 64.9 to 87.0 percent and a weighted average of 70.2 percent in the machine building industries, the percentage of comparable output in the total commodity output was much lower in machine building than in other industries.

Table 9\*\*\* illustrates the detail with which the central planners provided individual industries with cost data in the 1941 plan. In addition to giving the full cost of commodity output, the plan listed for each major industry (except the defense industry) the outlays for production broken down by conventional primary elements. The over-all cost of each primary element, established on a national scale elsewhere in the plan and allocated among the individual industries, was based primarily on the level of cost reported by these industries in the previous plan period but was adjusted to reflect planned reductions in the cost of comparable output and the estimated cost of non-comparable output (new articles) programed for 1941.

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\* 24/

\*\* Table 8 follows on p. 84.

\*\*\* Table 9 follows on p. 85.

Table 8

USSR: Data on the Planned Cost of Commodity Output of Industry a/  
1941

Peoples Commissariats	Planned Cost of Total Commodity Output b/ (Million Current Rubles)	Planned Comparable Output c/ (Percent)	Planned Change in Level of Cost of Comparable Output d/ (Percent)	Planned Annual Savings (Million Current Rubles)
Coal industry	6,206	97.8	-6.3	408
Petroleum industry	3,674	92.0	-1.0	35
Electric power stations	3,395	99.1	-2.8	98
Ferrous metallurgy	14,621	96.4	-3.5	507
Nonferrous metallurgy	7,800	97.0	-2.0	154
Chemical industry	7,992	92.2	-4.0	305.1
Construction materials	3,160	93.8	-5.3	166
Heavy machine building	4,440	70.0	-6.0	198
Medium machine building	8,750	87.0	-8.3	662
General machine building	2,440	66.0	-7.0	122
Electrical industry	3,676	80.0	-6.0	188
Defense industry	32,838	64.9	-11.1	2,675
Timber industry				
Procurement	4,093	100.0	-6.7	295.4
Processing	3,287	86.5	-2.6	76.3
Paper industry	1,320	95.0	+0.5	-6
Light industry	20,300	93.0	-1.7	326
Textile industry	28,080	96.0	-1.1	300
Food industry	39,666	97.9	-1.2	472
Meat and dairy industry	8,012	96.0	-1.4	112
Fish industry	3,534	96.4	-3.1	107
Total industry e/	213,473	89.3	-3.7	7,397

a. <sup>25/</sup> Machine building commissariats are underscored.

b. The ratio between 1941 rubles and 1941 US dollars was 5.3 to 1. Total commodity output is the sum of comparable and noncomparable output.

c. Comparable output consists of those goods and services produced in a given year that also were produced in the preceding year.

d. In terms of average annual costs in preceding year (1940).

e. Components do not add to totals shown, because totals include the industrial output of local industry, nonindustrial commissariats, and committees and main administrations of the Council of Peoples Commissars, USSR, in addition to the industrial commissariats listed above.

Table 9

USSR: Data on the Planned Cost of Commodity Output  
in Machine Building Commissariats a/  
1941

Planned Costs of Commodity Output	Unit	Peoples Commissariats			
		Heavy Machine Building	Medium Machine Building	General Machine Building	Electrical Industry
Outlays for production					
Materials	Million current rubles b/	2,271	5,300	1,190	2,236
Fuel and electric energy	Million current rubles	275	328	88	130
Wages and deductions	Million current rubles	1,400	2,352	886	1,057
Amortization	Million current rubles	136	250	56	75
Other expenditures	Million current rubles	248	360	150	182
Subtotal	Million current rubles	4,330	8,590	2,370	3,680
Nonproductional expenditures	Million current rubles	40	105	52	66
Full cost of commodity output c/	Million current rubles	4,440	8,750	2,440	3,676
Of which:					
Cost of comparable output d/	Million current rubles	3,108	7,612	1,610	2,941
Of which:					
Costs arising from price change effective 1 January 1941	Million current rubles	5	10	3	36
Change in level of cost of comparable output	Percent	-6.0	-8.0	-7.0	-6.0
Annual savings from change in level of cost	Million current rubles	198	662	122	188

a. 26/. This source does not contain data of the above type for the Peoples Commissariat of Defense Industry except as shown in Table 8, p. 84, above.

b. The ratio between 1941 rubles and 1941 US dollars was 5.3 to 1.

c. Totals given in the source do not agree with the sums of the components given in the source.

d. Comparable output consists of those goods and services produced in a given year that also were produced in the preceding year.

## APPENDIX E

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